

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report								
RSY Pad: RSY 35 Use 1				Soil Origin: TU-107A ESU				
Data attached and submitted by: Amy Mangel				Data Report Submittal Date: 01/25/2021				

Systematic Soil Sample Data: RSY 35 Use 1								
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)	²³² Th Final Analytical Results (pCi/g)
Project Remediation Goals*								
HPPG-ESU-TU107A-001	1	Systematic	9,353	15,359	0.281	-0.00897	-0.0187	0.309
HPPG-ESU-TU107A-002	2	Systematic	10,317	15,359	0.405	0.00504	N/A	N/A
HPPG-ESU-TU107A-003	3	Systematic	9,861	15,359	0.420	0.0162	N/A	N/A
HPPG-ESU-TU107A-004	4	Systematic	9,775	15,359	0.355	-0.0249	N/A	N/A
HPPG-ESU-TU107A-005	5	Systematic	9,175	15,359	0.352	0.0106	N/A	N/A
HPPG-ESU-TU107A-006	6	Systematic	10,236	15,359	0.143	-0.0341	N/A	N/A
HPPG-ESU-TU107A-007	7	Systematic	9,297	15,359	0.301	-0.00685	N/A	N/A
HPPG-ESU-TU107A-008	8	Systematic	9,408	15,359	0.302	0.0240	N/A	N/A
HPPG-ESU-TU107A-009	9	Systematic	9,487	15,359	0.451	0.0355	N/A	N/A
HPPG-ESU-TU107A-010	10	Systematic	9,383	15,359	0.353	-0.0234	N/A	N/A
HPPG-ESU-TU107A-011	11	Systematic	9,738	15,359	0.196	-0.0176	0.0643	0.363
HPPG-ESU-TU107A-012	12	Systematic	10,148	15,359	0.461	0.0280	N/A	N/A
HPPG-ESU-TU107A-013	13	Systematic	9,505	15,359	-0.0867	0.0337	N/A	N/A
HPPG-ESU-TU107A-014	14	Systematic	9,494	15,359	0.440	-0.0315	N/A	N/A
HPPG-ESU-TU107A-015	15	Systematic	9,282	15,359	0.293	0.00221	N/A	N/A
HPPG-ESU-TU107A-016	16	Systematic	9,806	15,359	0.489	0.0238	N/A	N/A
HPPG-ESU-TU107A-017	17	Systematic	10,260	15,359	0.562	0.0387	N/A	N/A
HPPG-ESU-TU107A-018	18	Systematic	10,224	15,359	0.370	0.0273	N/A	N/A
HPPG-ESU-TU107A-019	19	Systematic	9,536	15,359	0.318	0.00245	N/A	N/A
HPPG-ESU-TU107A-020	20	Systematic	10,026	15,359	0.405	-0.0534	N/A	N/A
HPPG-ESU-TU107A-021	21	Systematic	9,254	15,359	0.382	-0.0400	0.216	0.383
HPPG-ESU-TU107A-022	22	Systematic	9,738	15,359	0.472	-0.0781	N/A	N/A
HPPG-ESU-TU107A-023	23	Systematic	9,665	15,359	-0.0753	-0.0419	N/A	N/A
HPPG-ESU-TU107A-024	24	Systematic	9,842	15,359	0.404	-0.0284	N/A	N/A
HPPG-ESU-TU107A-025	25	Systematic	10,008	15,359	0.339	-0.0295	N/A	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)	²³² Th Final Analytical Results (pCi/g)
					Maximum	0.562	0.0387	0.216
					Mean	0.3333	-0.0068	0.0872
					Median	0.355	-0.00680	0.0643
					Minimum	-0.0867	-0.0781	-0.0187
					Standard Deviation	0.1541	0.0313	N/A

Biased Soil Sample Data: RSY 35 Use 1								
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)	²³² Th Final Analytical Results (pCi/g)
Project Remediation Goals*								
HPPG-ESU-TU107A-B-001	1	Biased	10,530	15,359	0.339	-0.00994	0.0868	0.344

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11052020-PG-ROV-278	11/05/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11062020-PG-JSS-283	11/06/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11062020-PG-JSS-281	11/06/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11072020-PG-JSS-285	11/07/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 4	Th-232 (2614 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 35 Use 1
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 54 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 54 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-67. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 68-109). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for ⁹⁰ Sr and ²³² Th (via alpha spectroscopy). Strontium-90 and ²³² Th results are also included in the TestAmerica sample results reports (pages 68-109, and pages 110-126). Samples HPPG-F-027 and HPPG-F-028 are field duplicates, correlating to systematic samples -009 and -021. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data. As a result of a COC generation error, APTIM erroneously requested plutonium and uranium alpha spectroscopy analyses for 10% of the systematic samples, instead of thorium alpha spectroscopy analysis. The alpha spectroscopy analyses for Thorium-232 were requested after the samples and COC had been shipped to the lab (page 127), which is why those analyses are not marked on the COCs. Uranium-235 and Plutonium-239 are not ROCs for TU-107.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 128-143). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
Conclusions:
In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.
RSY 35 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-107A ESU.
APTIM requests RASO concurrence to release this soil as Non-LLRW.
Disposition: This soil shall be used as backfill for TU-107.

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-35-U1					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		5.01	31.07	16.03	16.03	4.03
ROI-04		3.01	29.06	13.79	14.03	3.75
ROI-06		68.14	138.34	103.26	103.22	10.84
ROI-07		48.10	115.24	78.69	78.18	9.30
ROI-08		89.18	179.37	127.82	127.28	11.80
ROI-10		2,251.78	2,839.59	2,527.48	2,523.48	89.94

Statistical Summary Reference Background

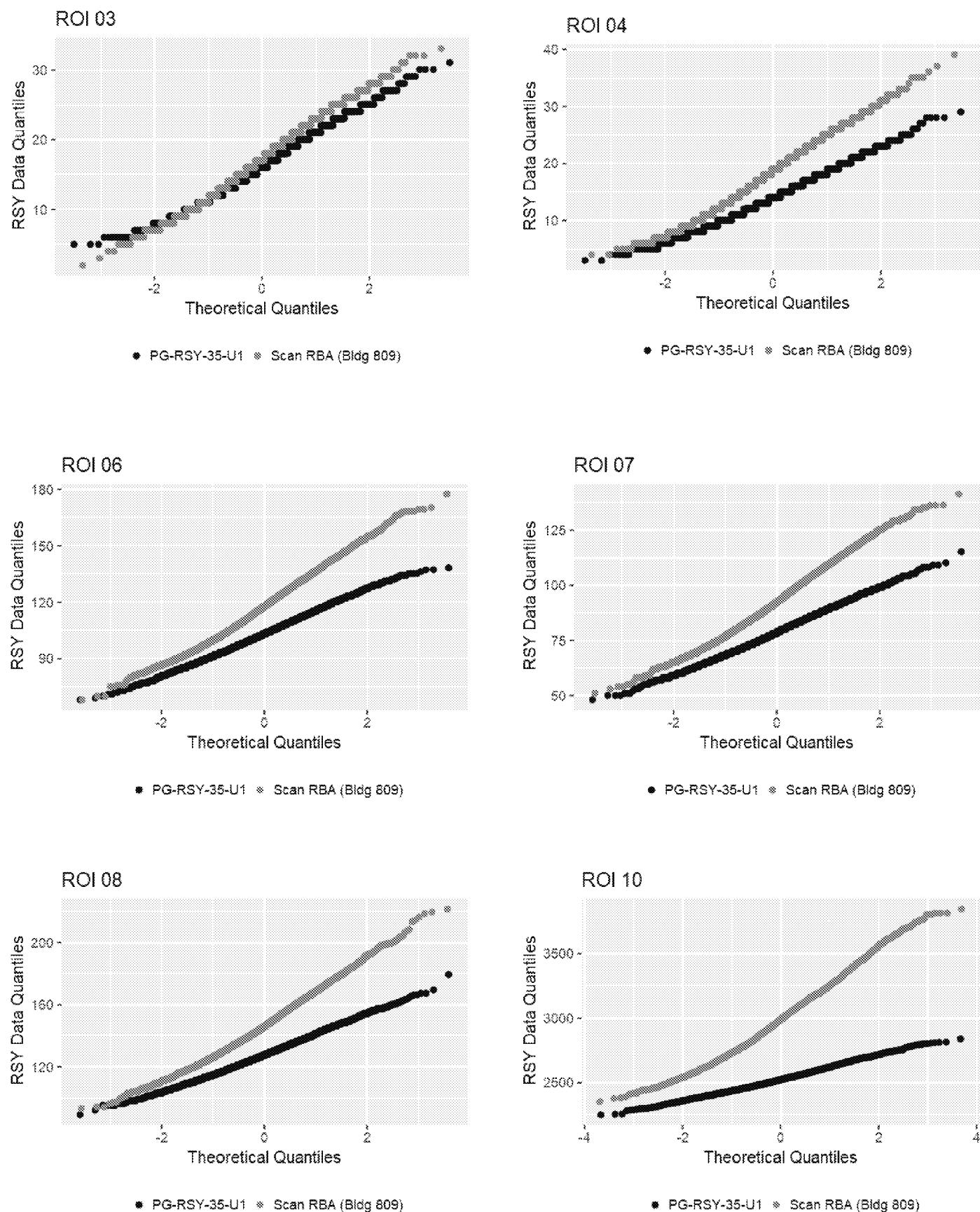
TYPE	Scan RBA (Bldg 809)					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
	ROI-03	2.00	33.08	16.21	16.04	4.13
	ROI-04	4.01	39.08	17.52	17.04	4.89
	ROI-06	68.15	177.45	117.58	117.26	15.50
	ROI-07	51.11	141.33	92.34	91.24	13.43
	ROI-08	93.19	221.48	146.24	145.30	18.21
	ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-35-U1	4234
Scan RBA (Bldg 809)	4632

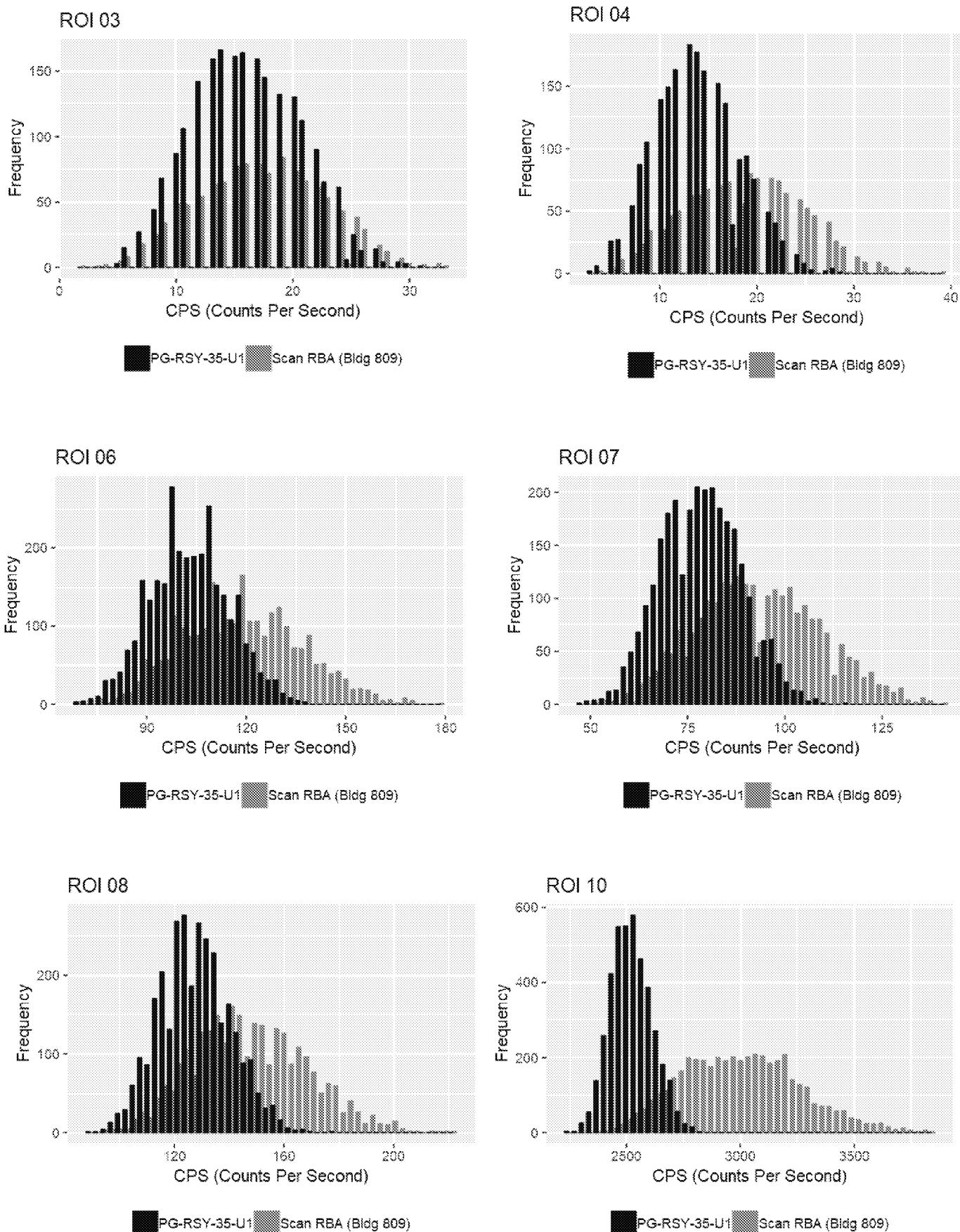
Soil Scan Statistics

Normal Q-Q Plots



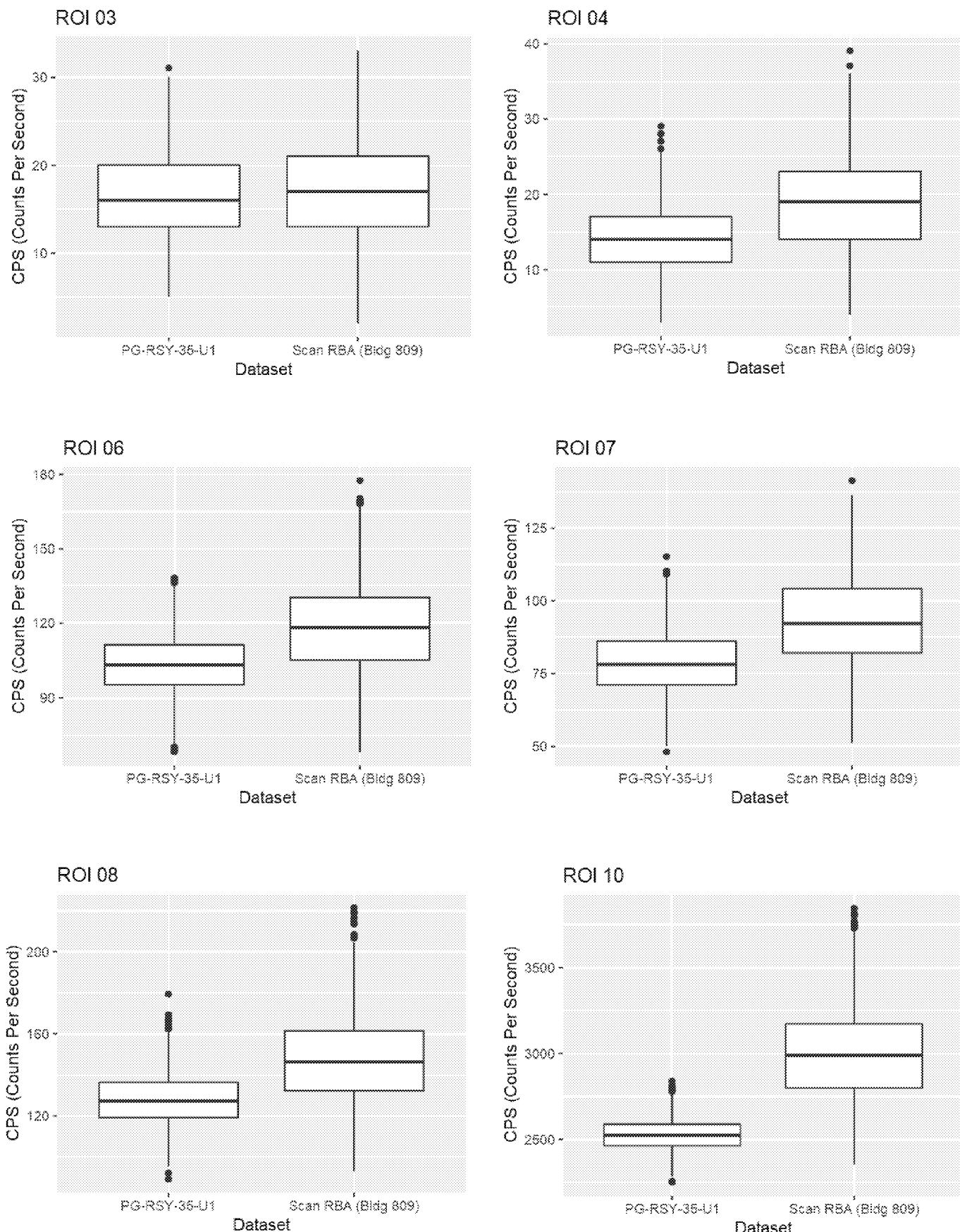
Soil Scan Statistics

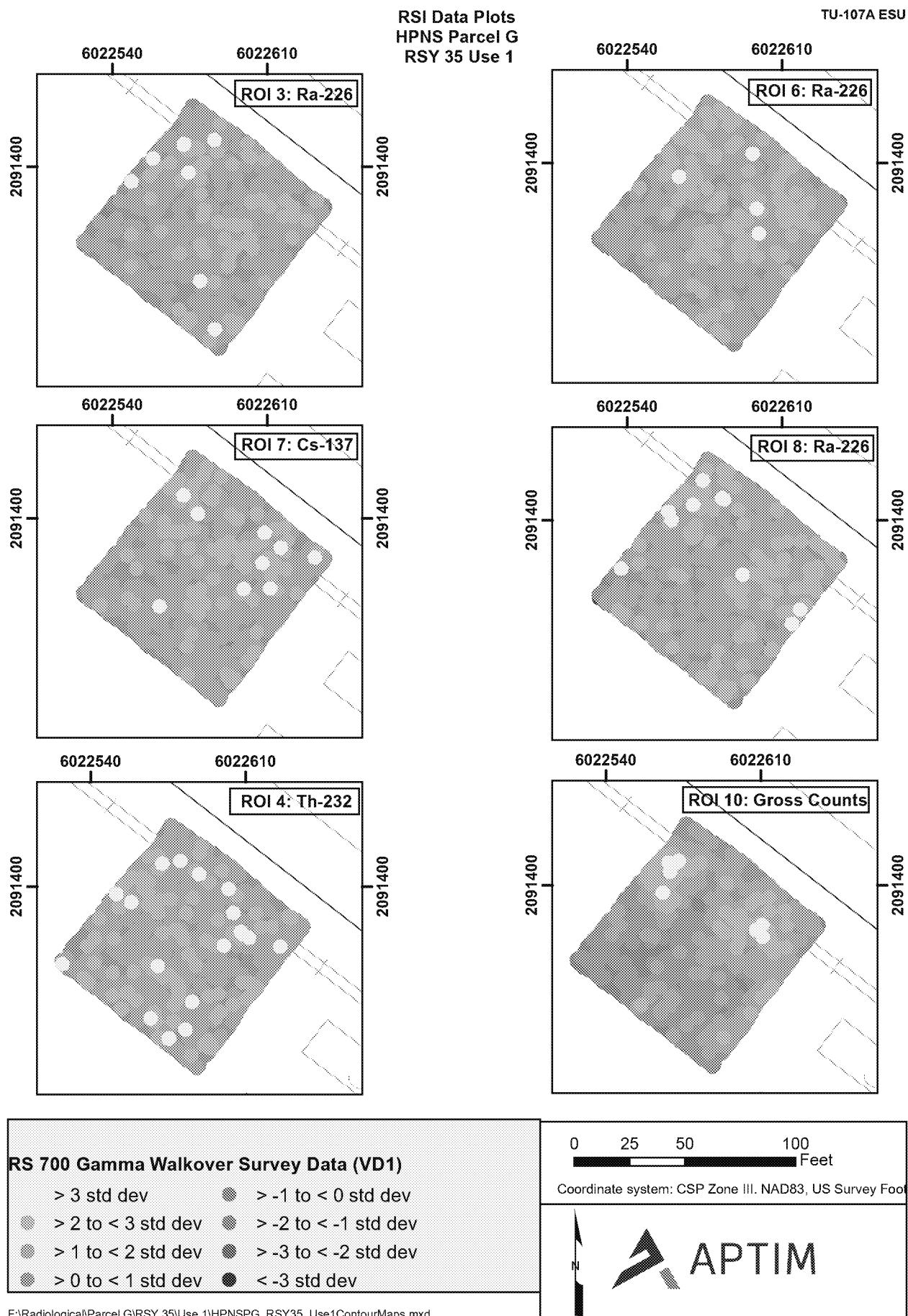
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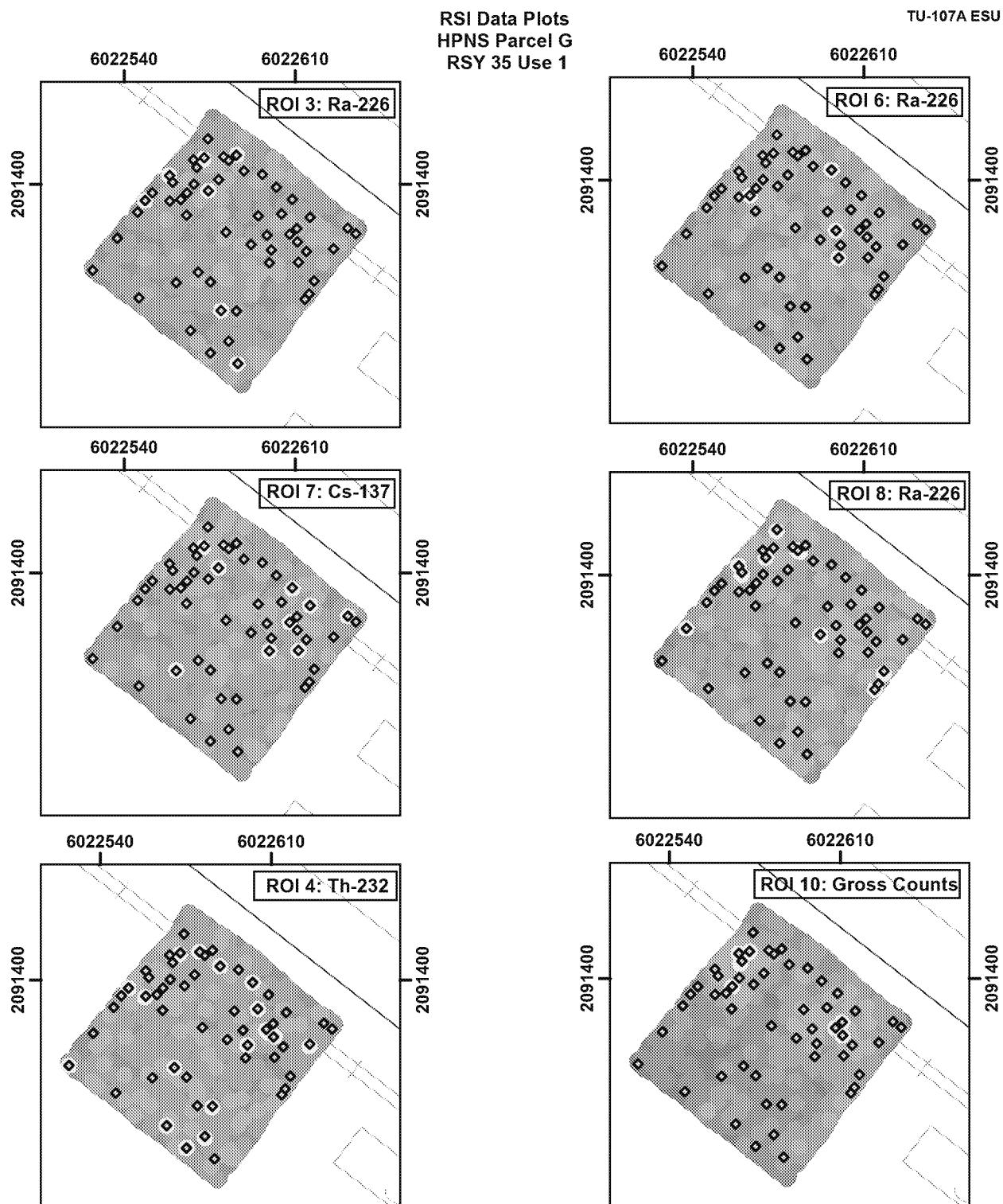


Soil Scan Statistics

Box Plots






RS 700 Gamma Walkover Survey Data (VD1)

- ◆ Follow-Up Locations
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

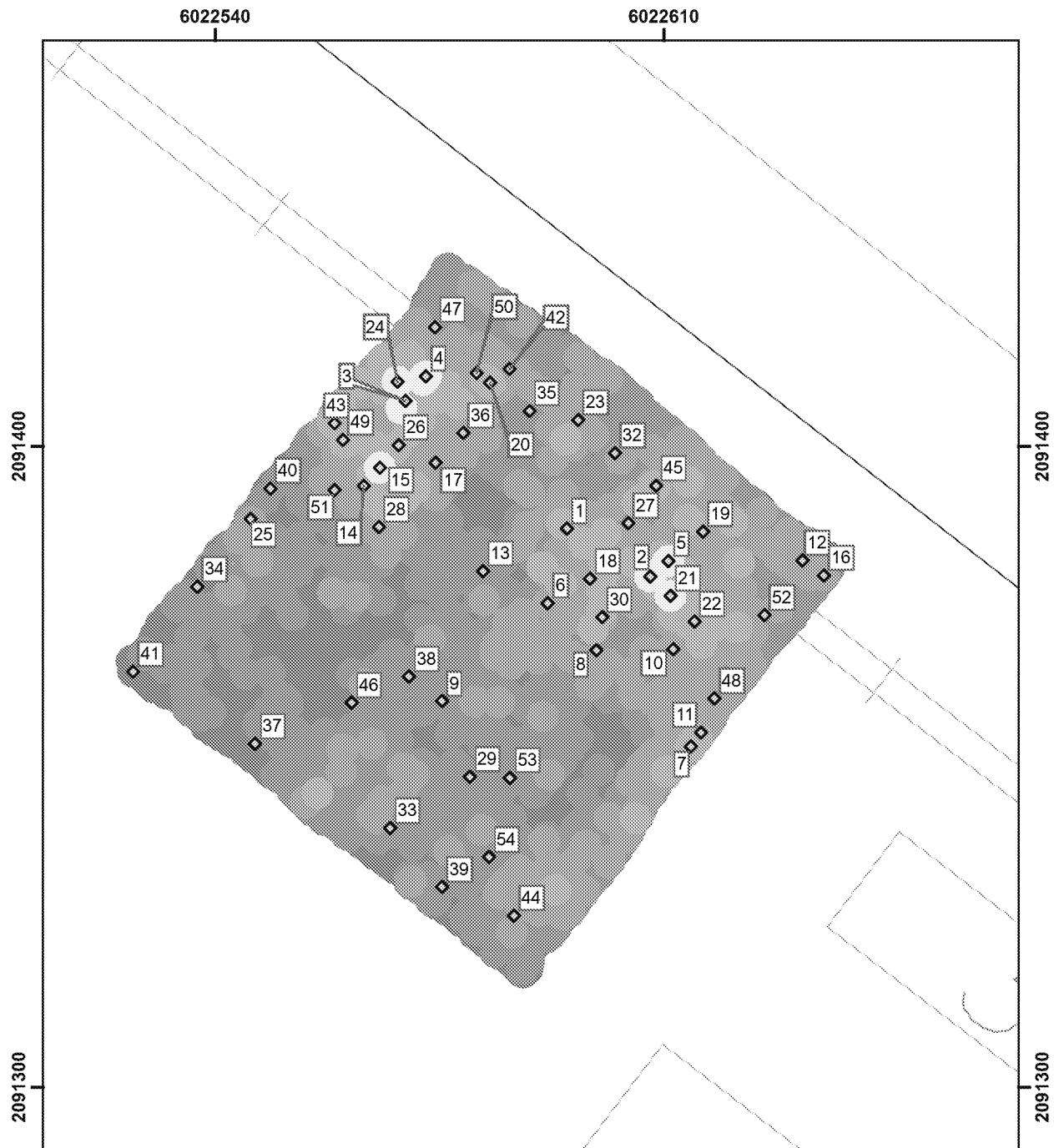
0 25 50 100
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



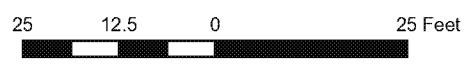
**Follow-Up Static Survey
HPNS Parcel G
RSY 35 Use 1**

TU-107A ESU

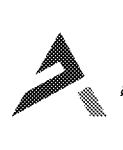


RSY 35 Use 1 (VD1, ROI 10 Gross Gamma)

- ◆ Follow-Up Locations
- > 1 to < 2 std dev
- > -2 to < -1 std dev
- > 3 std dev
- > 0 to < 1 std dev
- > -3 to < -2 std dev
- > 2 to < 3 std dev
- > -1 to < 0 std dev
- < -3 std dev



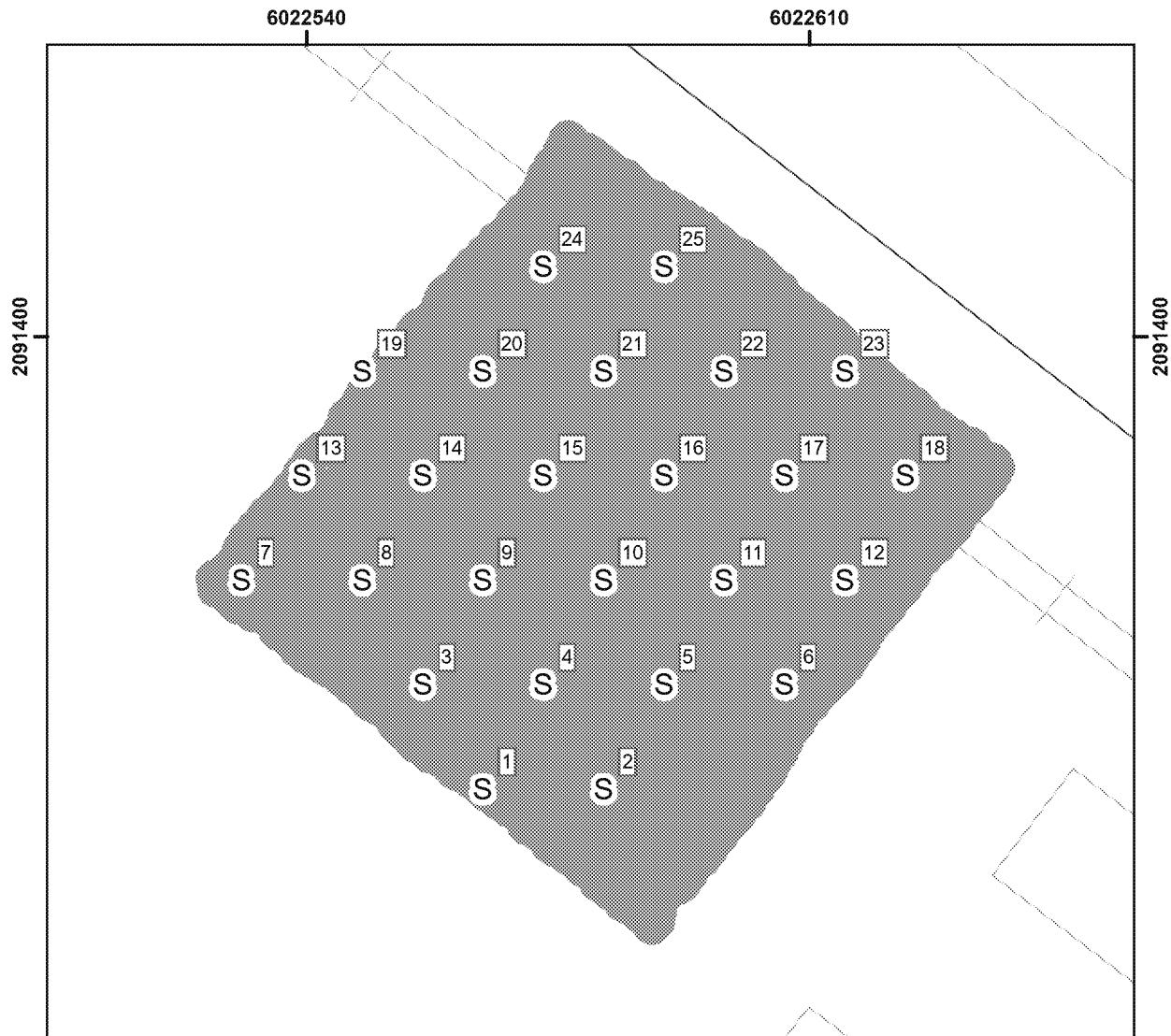
Coordinate system: CSP Zone III, NAD83, US Survey Foot



APTIM

Systematic Sampling
HPNS Parcel G
RSY 35 Use 1

TU-107A ESU



RSY 35 Use 1

S Systematic Sample Locations

RS-700 GWS Coverage

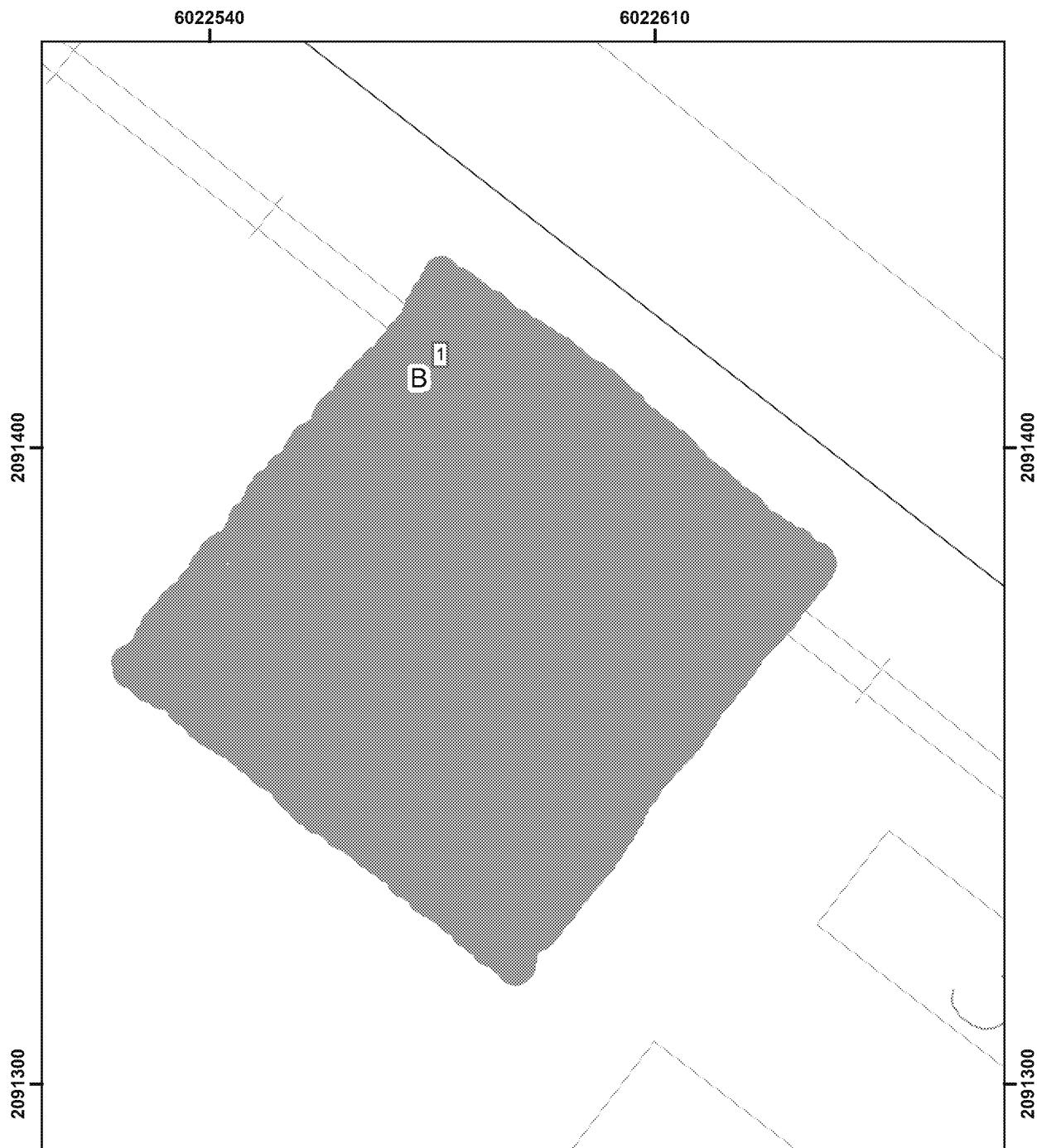
0 10 20 40 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



Biased Sampling
HPNS Parcel G
RSY 35 Use 1

TU-107A ESU



RSY 35 Use 1

B Biased Sample Location

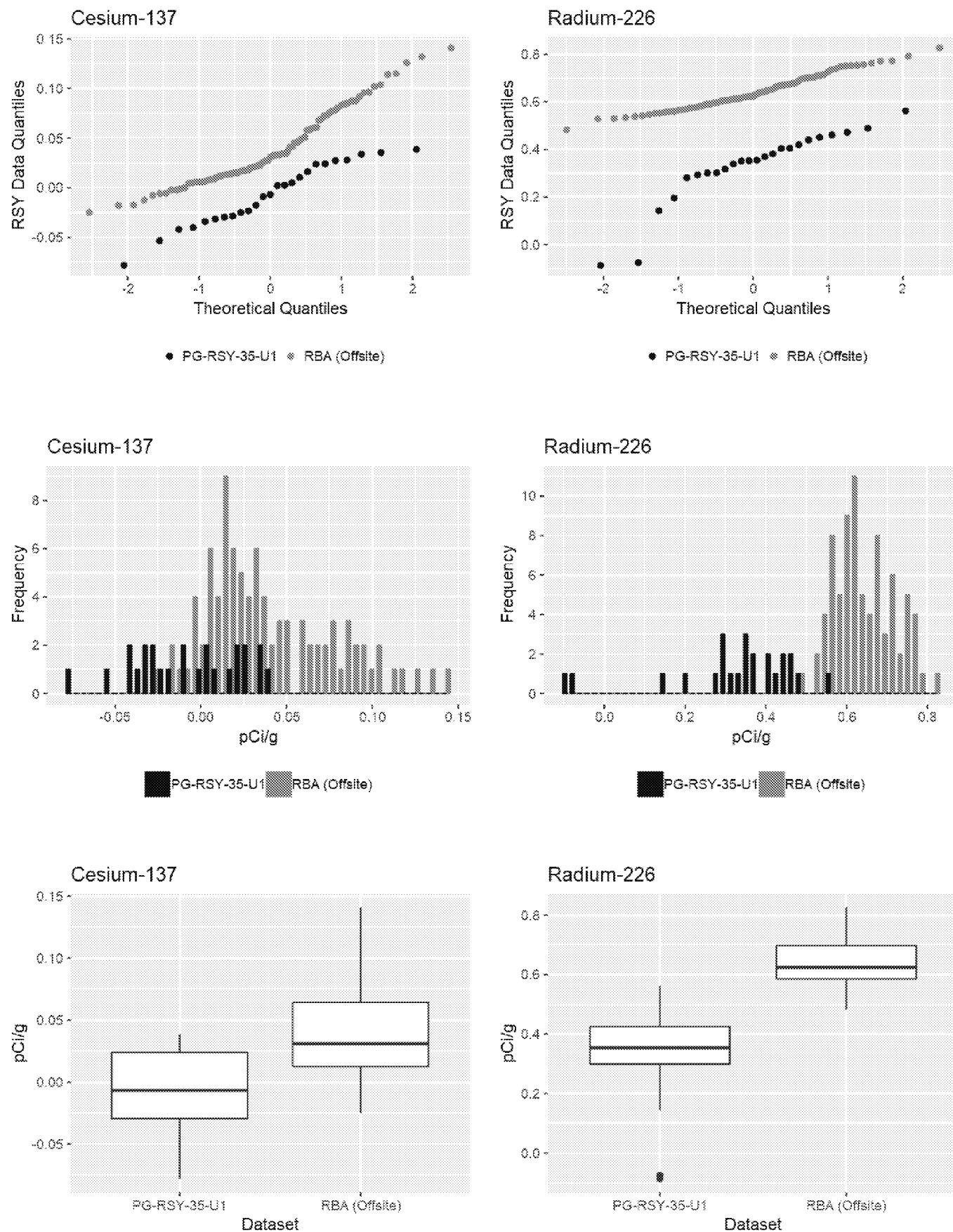
● RS-700 GWS Coverage

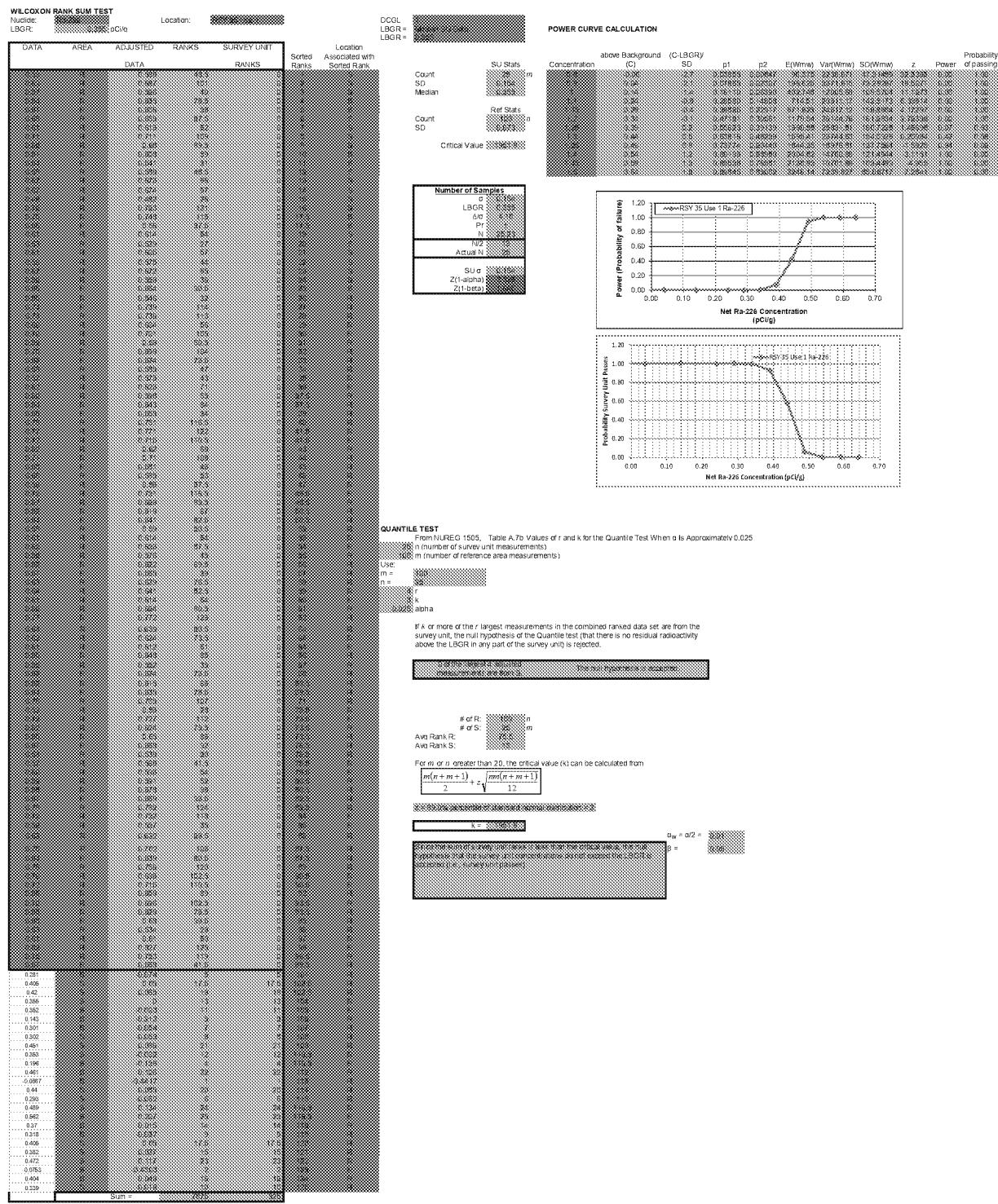
25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



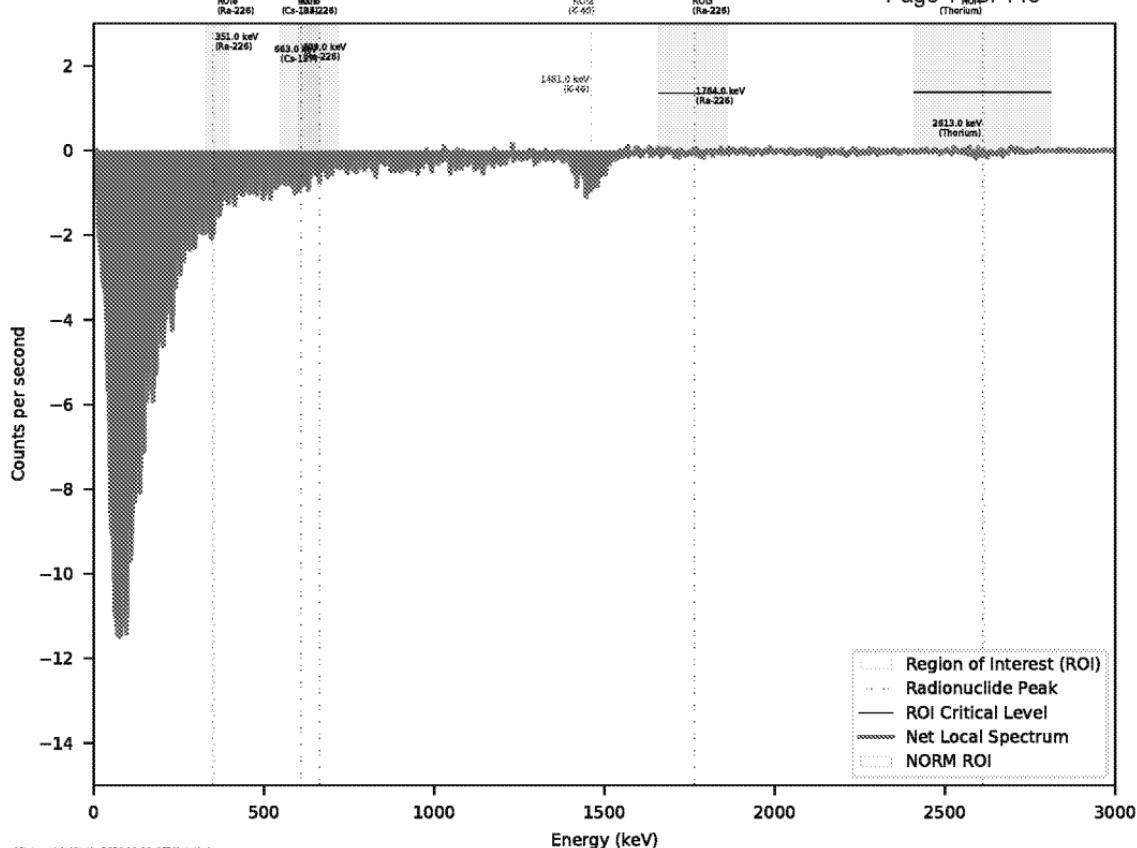
Soil Sample Statistics





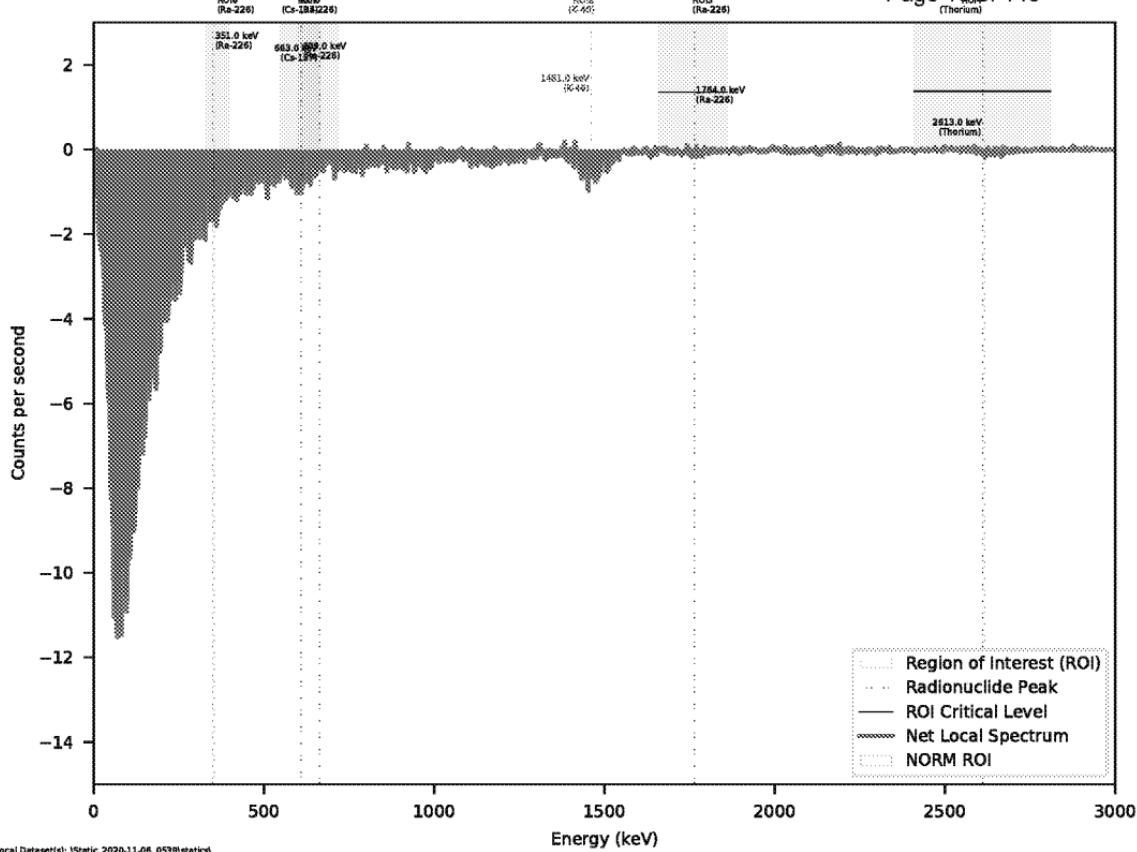
Net Gamma Spectrum, Static Location: 1

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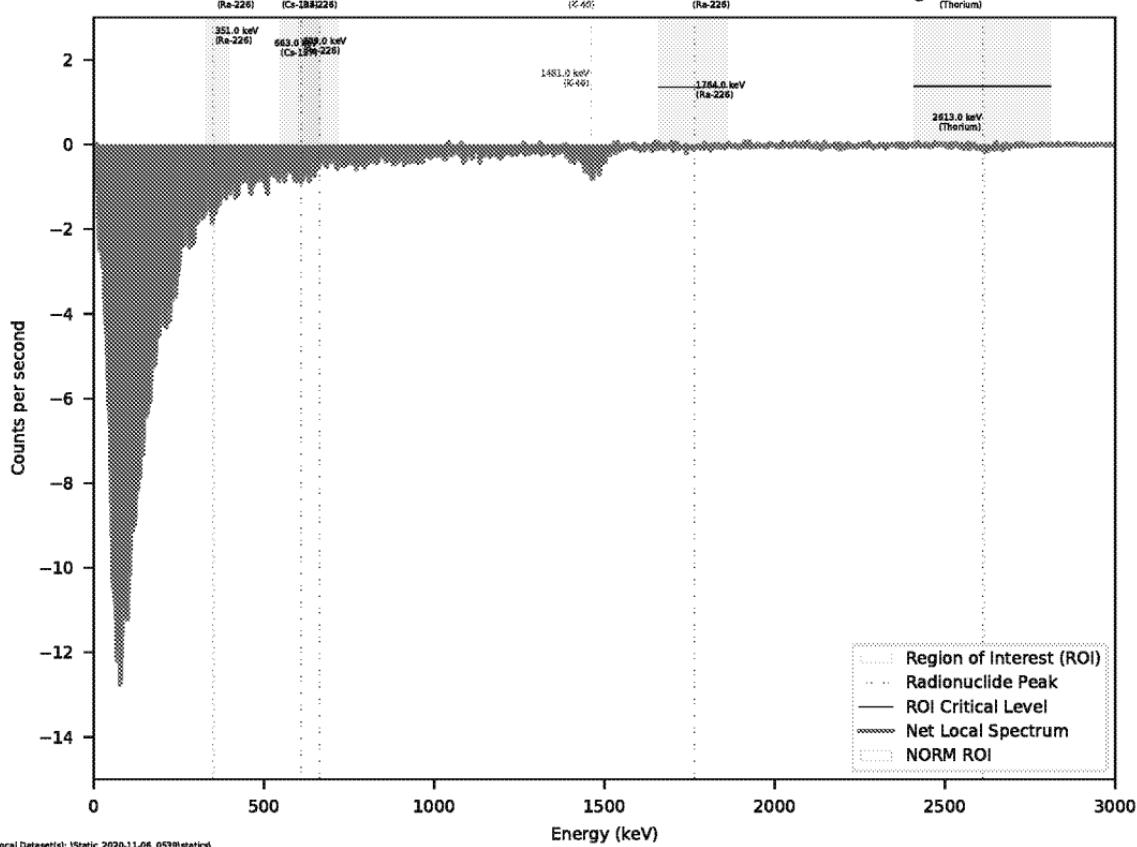
Net Gamma Spectrum, Static Location: 2

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Net Gamma Spectrum, Static Location: 3

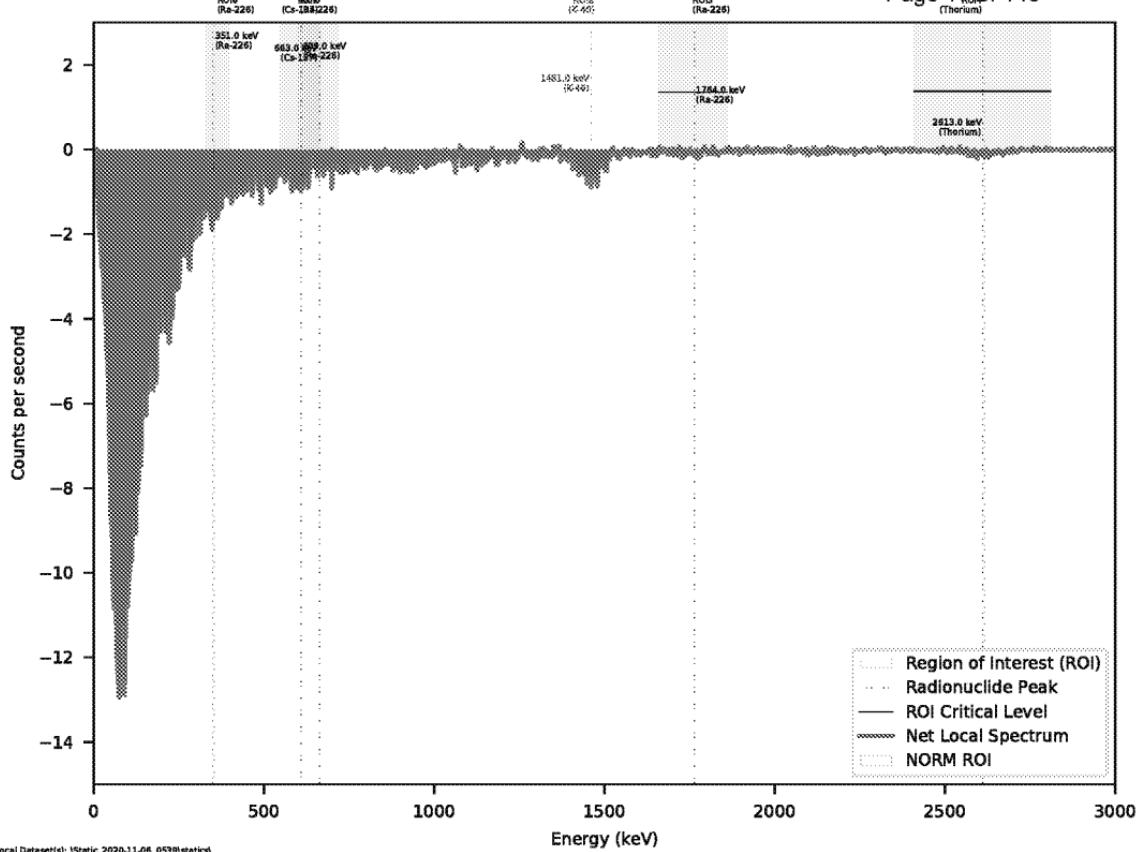
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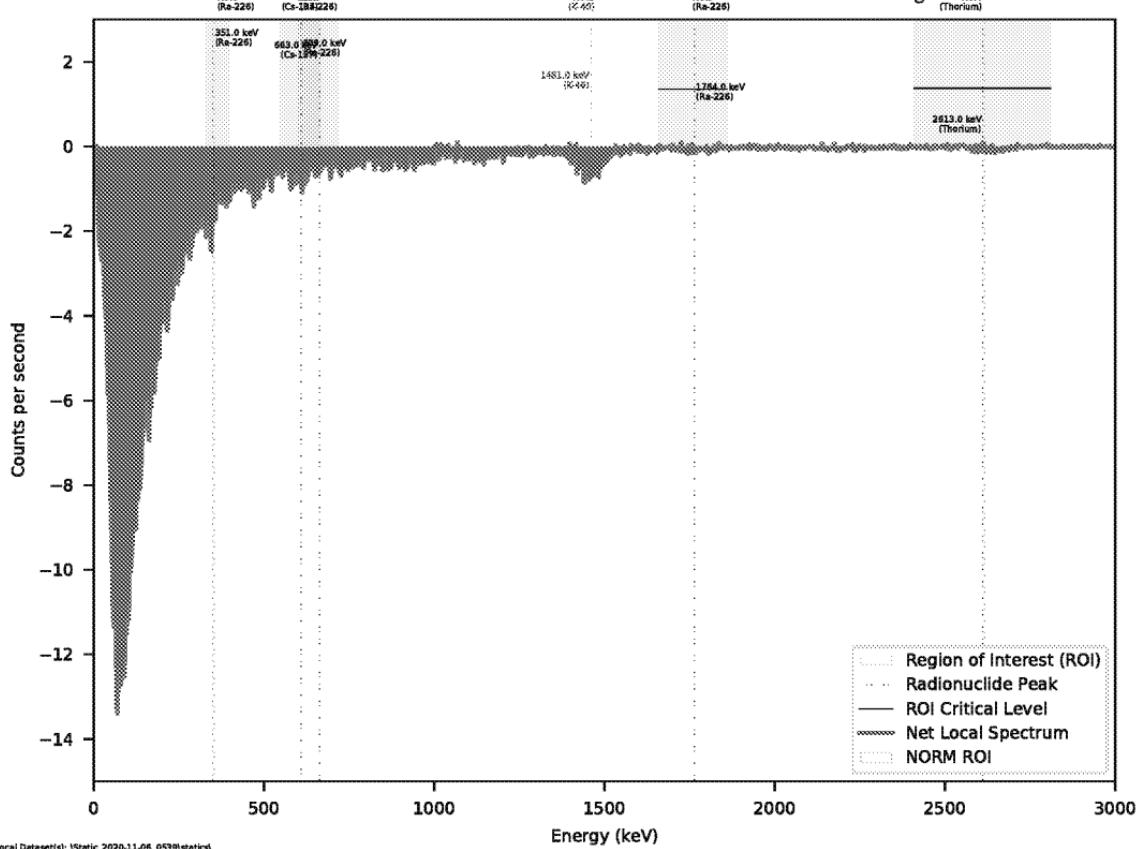
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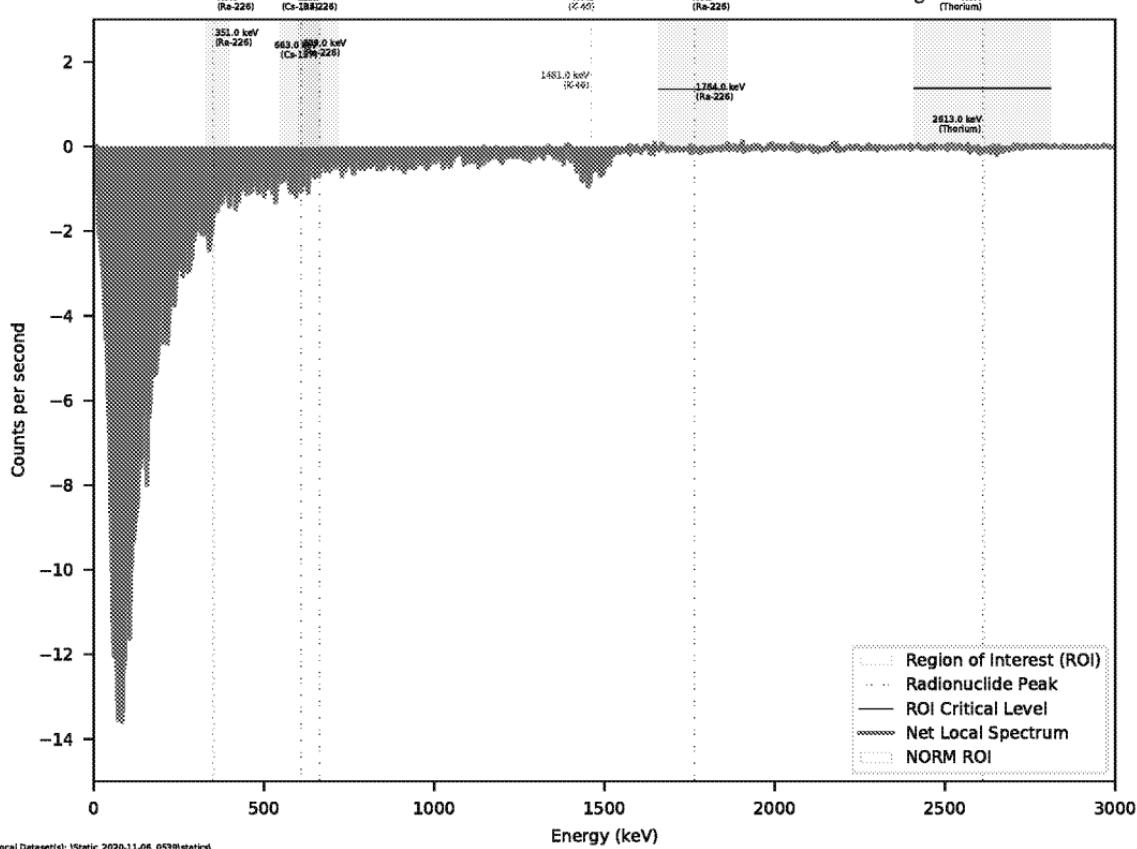
Net Gamma Spectrum, Static Location: 5

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Net Gamma Spectrum, Static Location: 6

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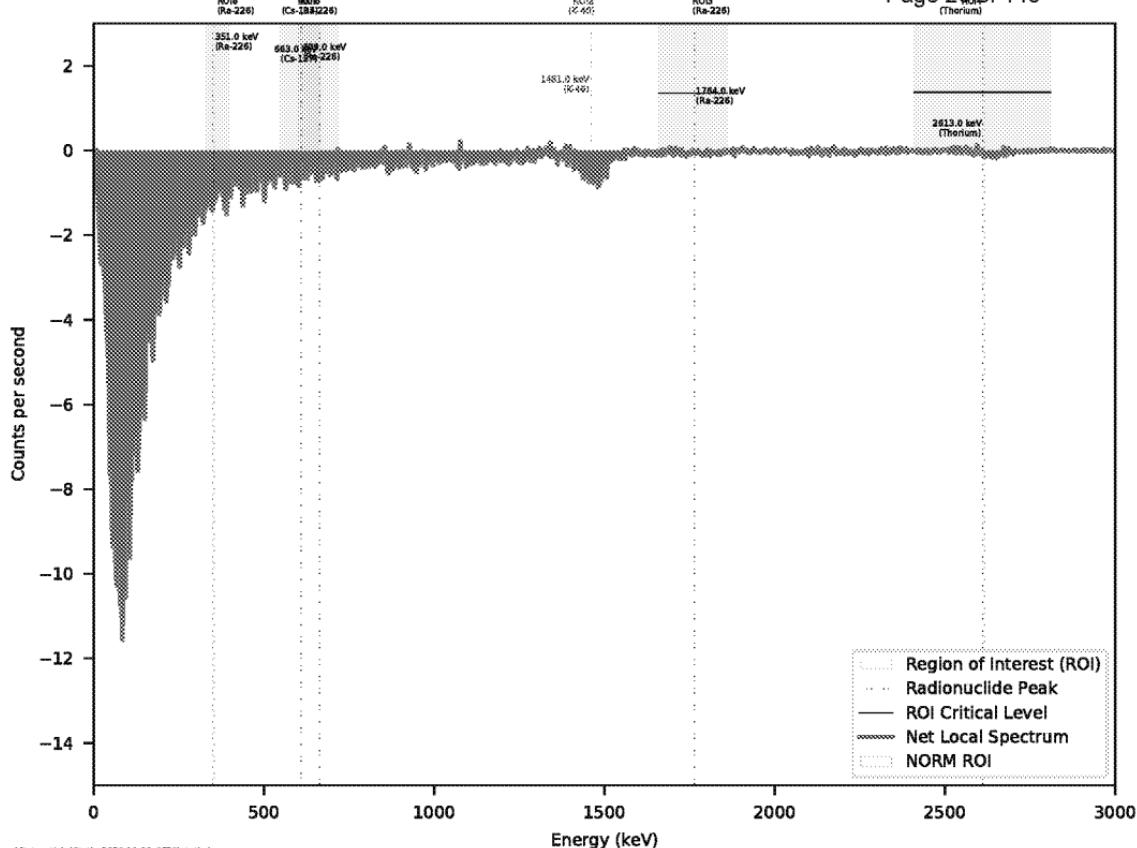
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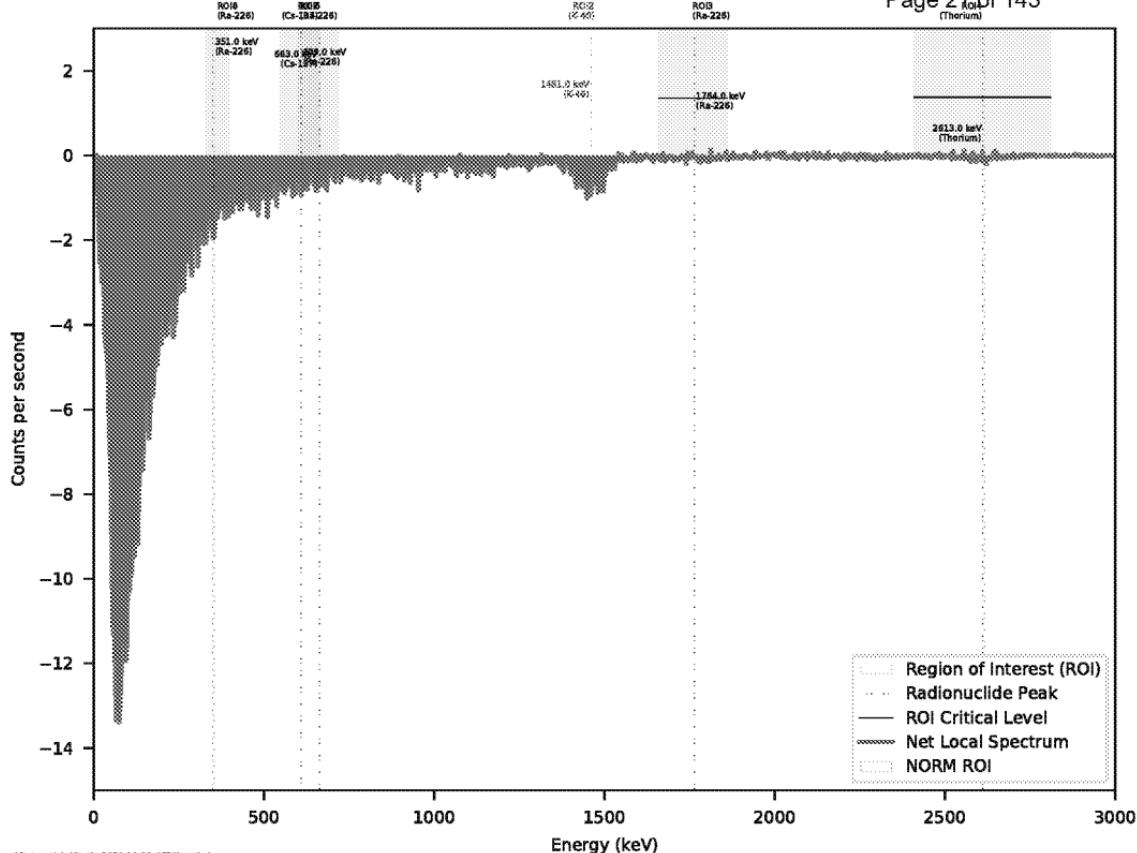
Net Gamma Spectrum, Static Location: 7

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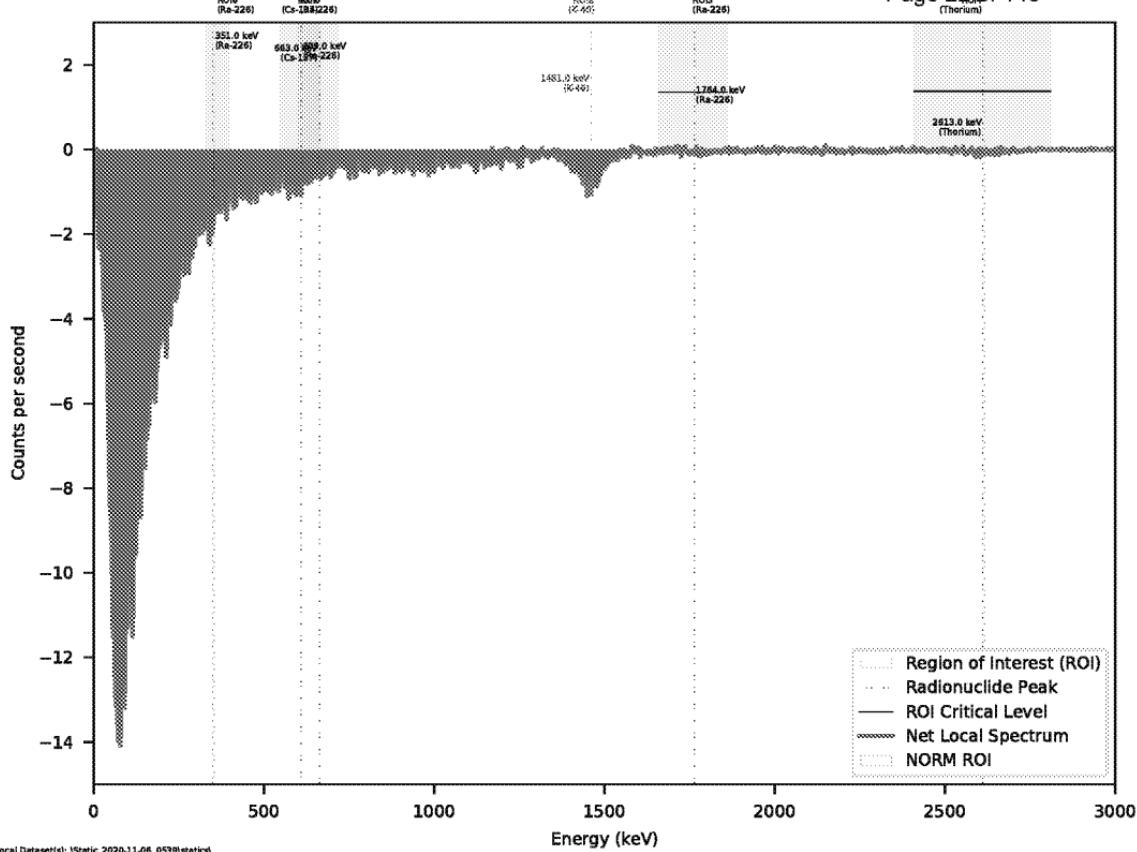
Net Gamma Spectrum, Static Location: 8

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Net Gamma Spectrum, Static Location: 9

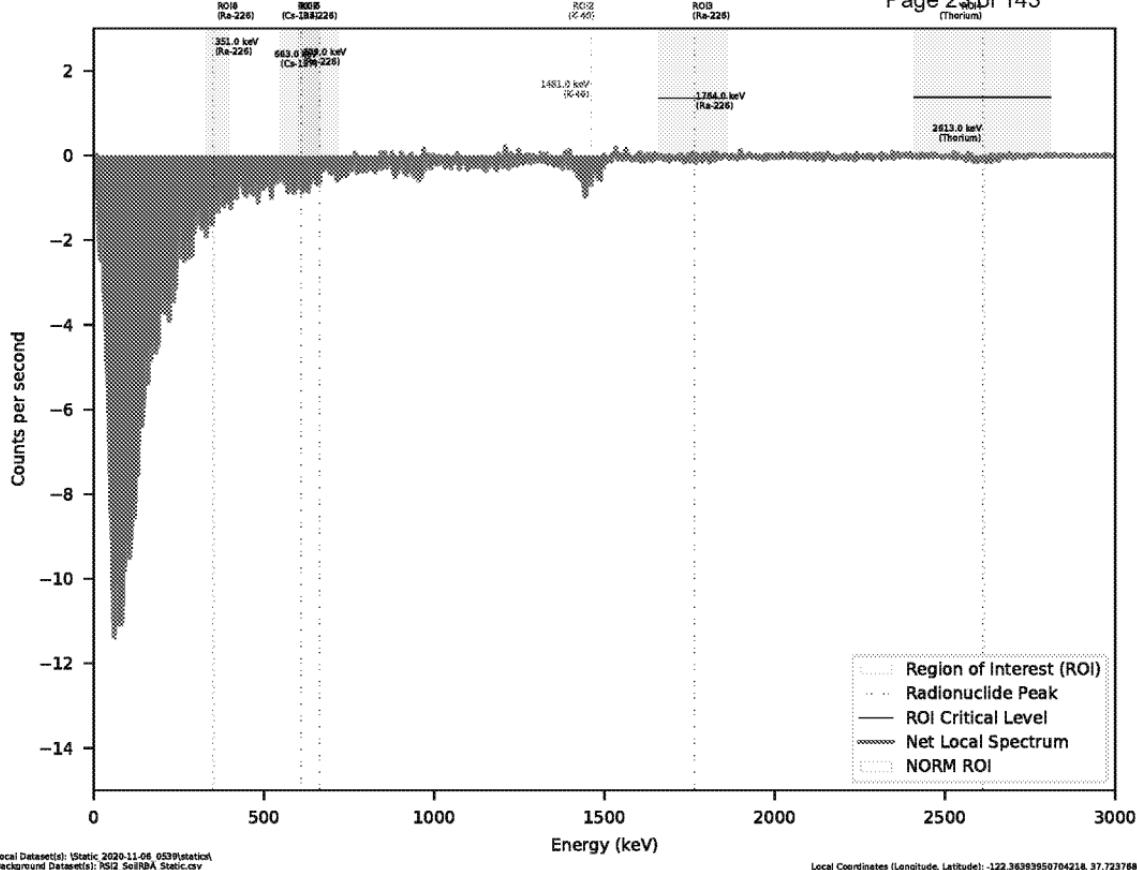
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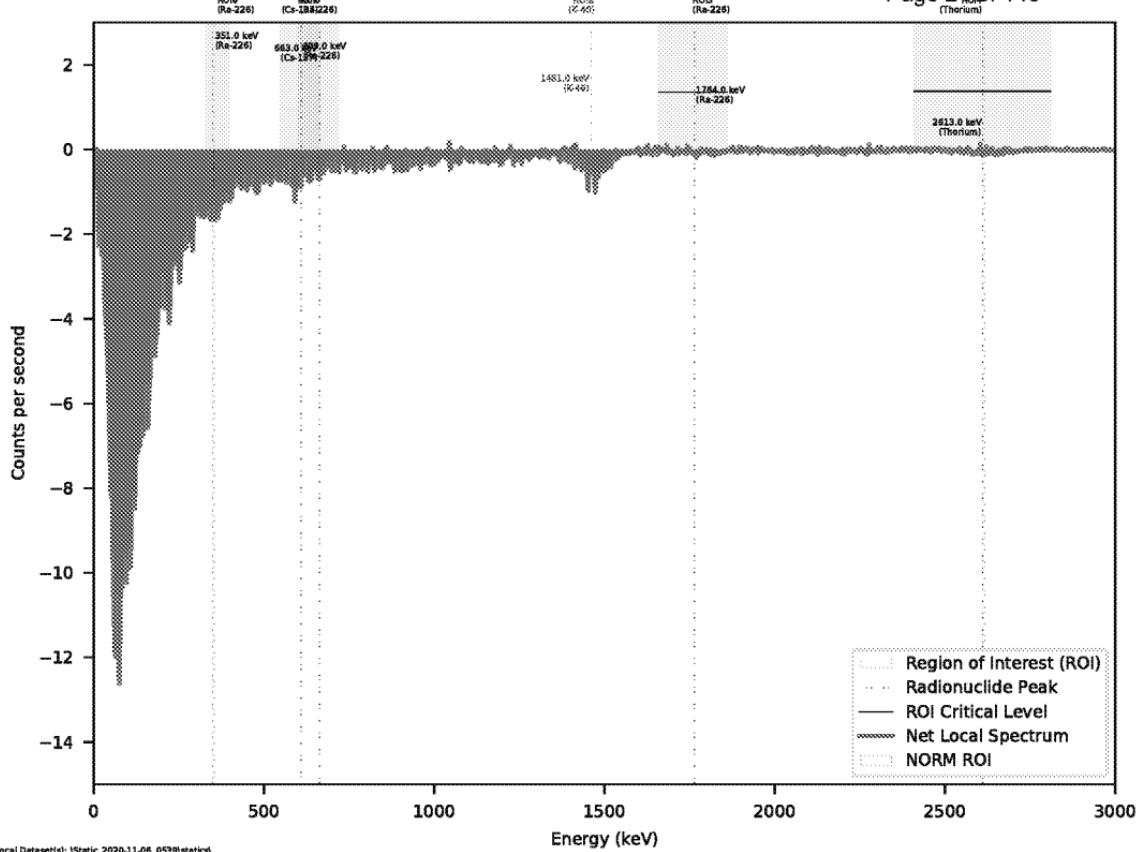
Net Gamma Spectrum, Static Location: 10

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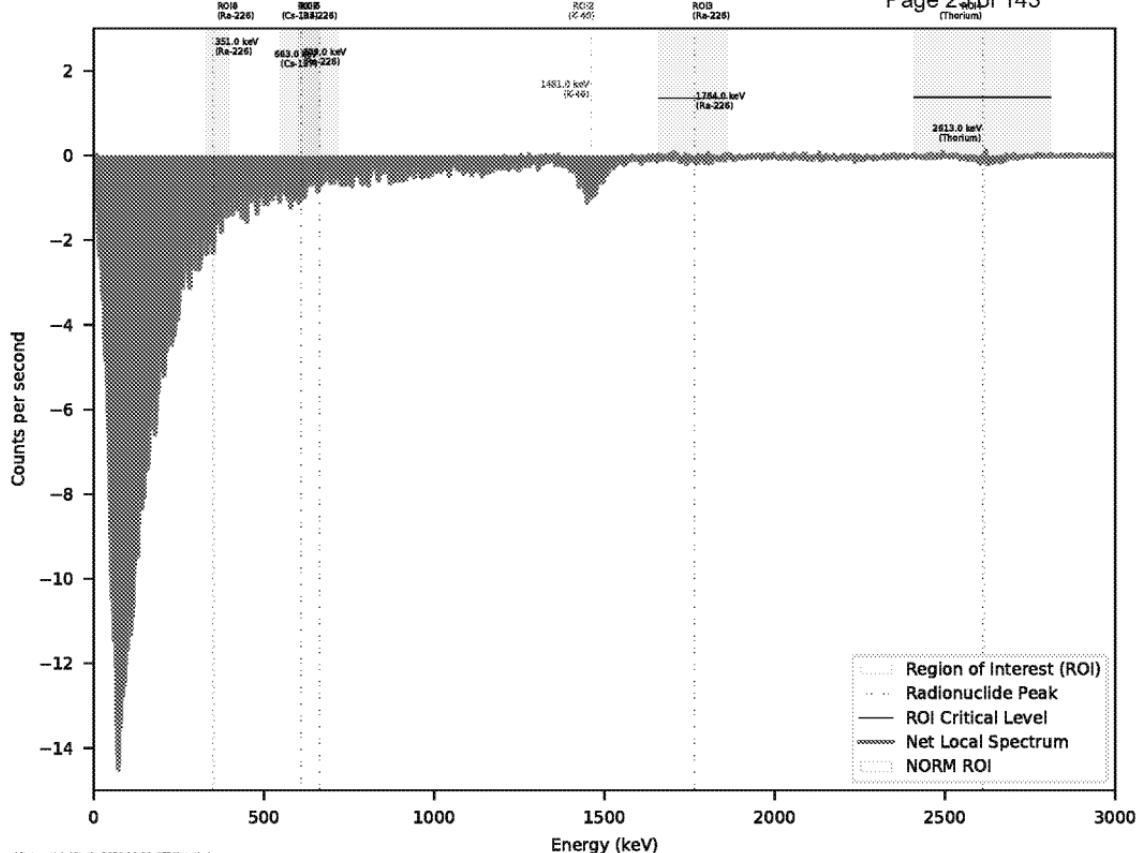
Net Gamma Spectrum, Static Location: 11

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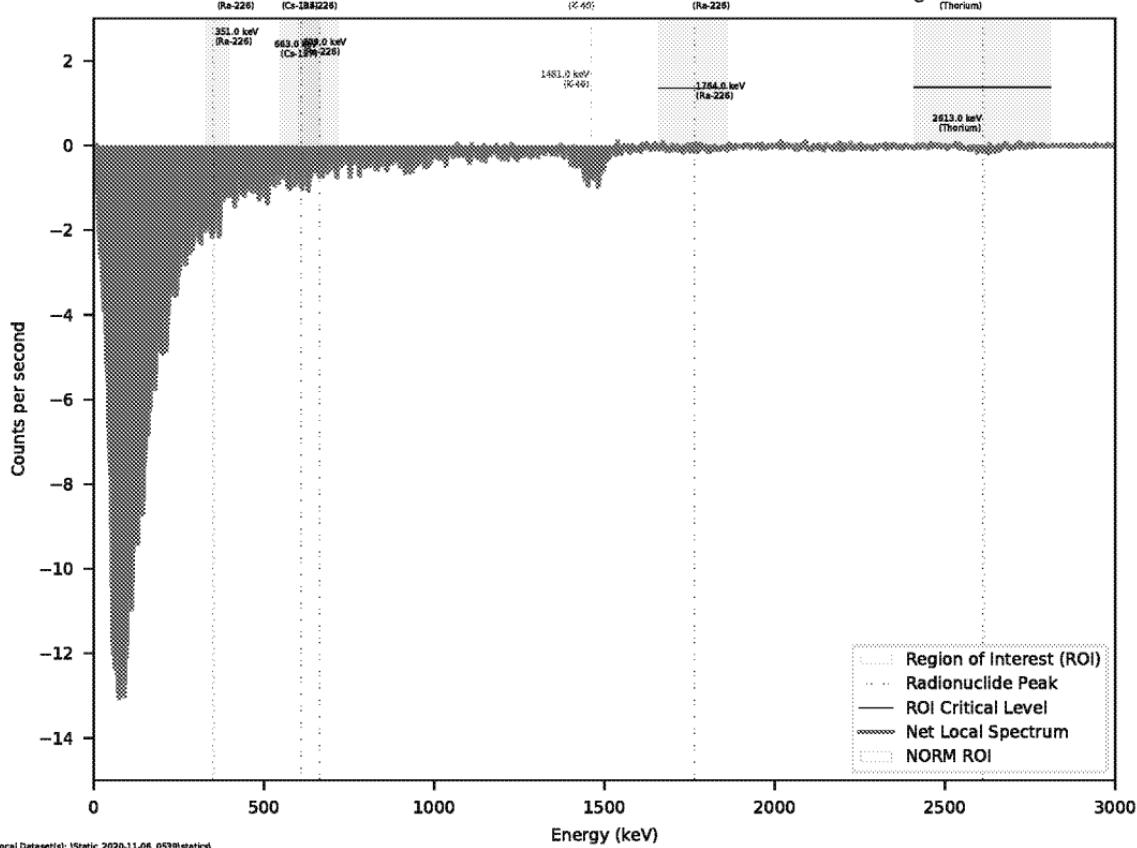
Net Gamma Spectrum, Static Location: 12

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Net Gamma Spectrum, Static Location: 13

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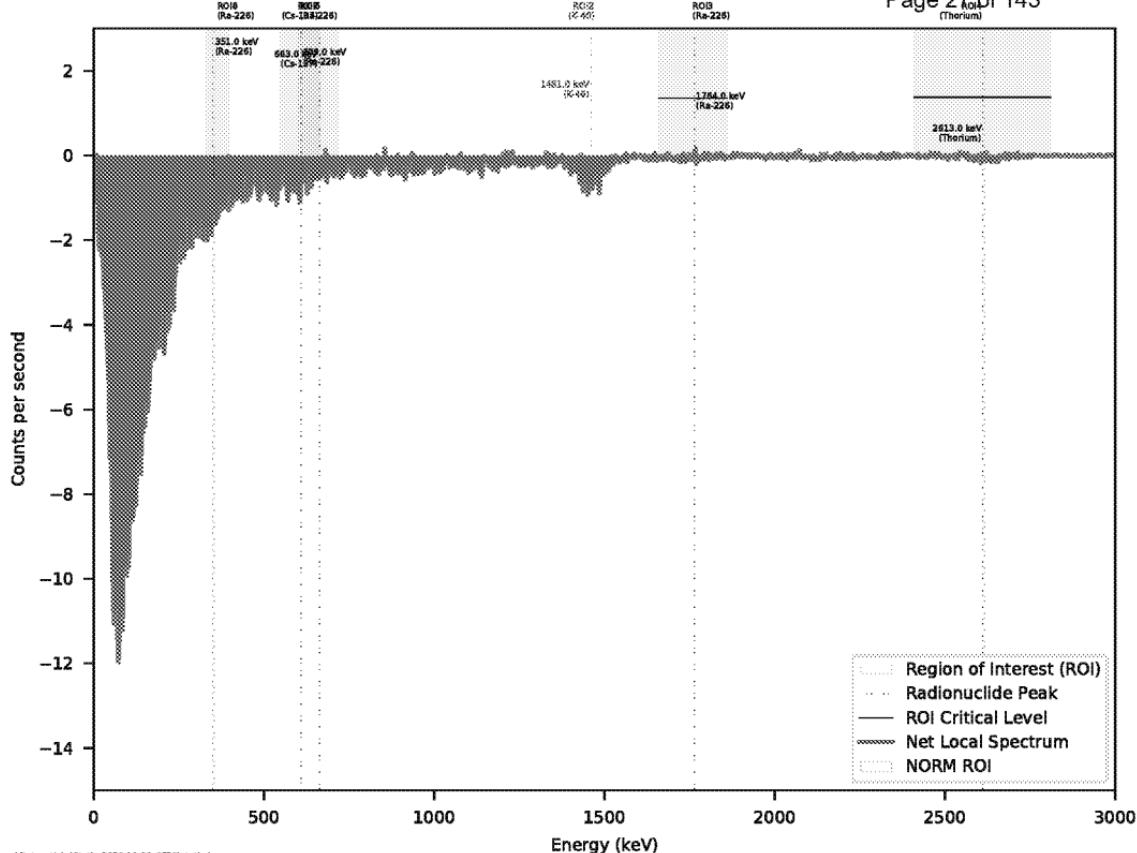
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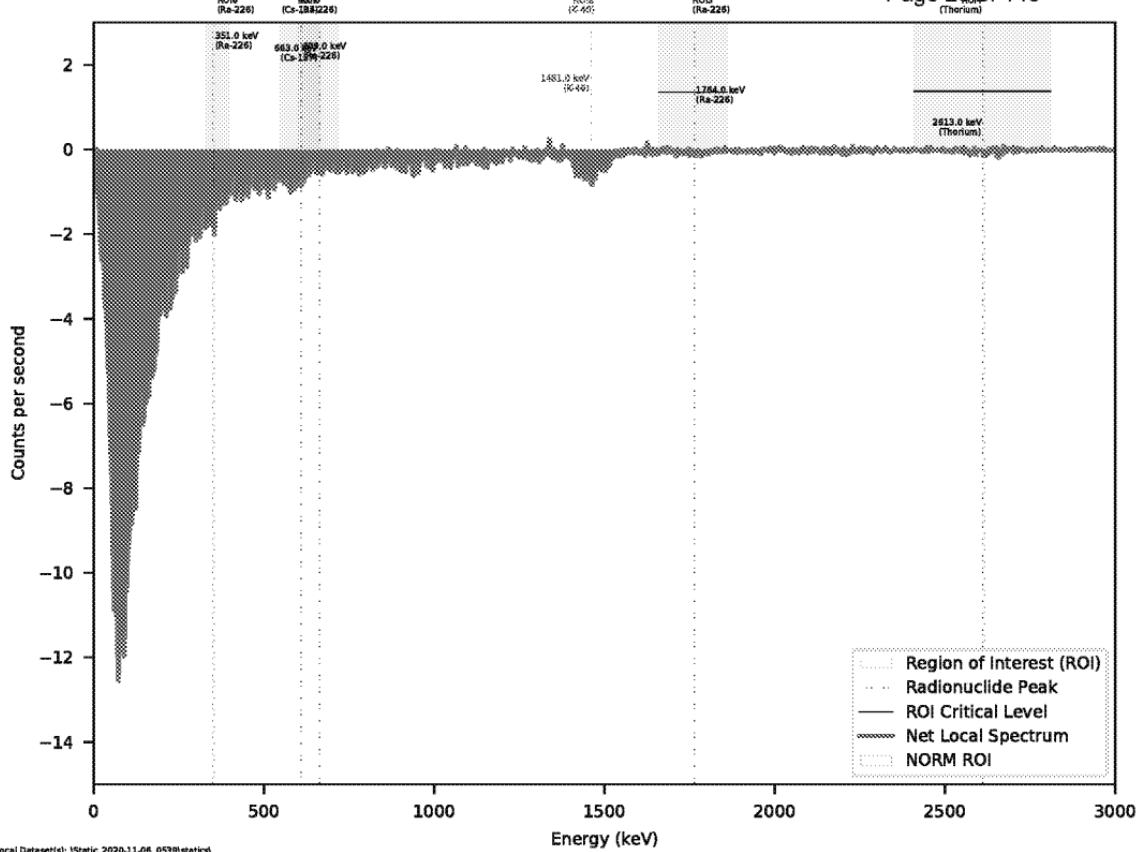
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Net Gamma Spectrum, Static Location: 15

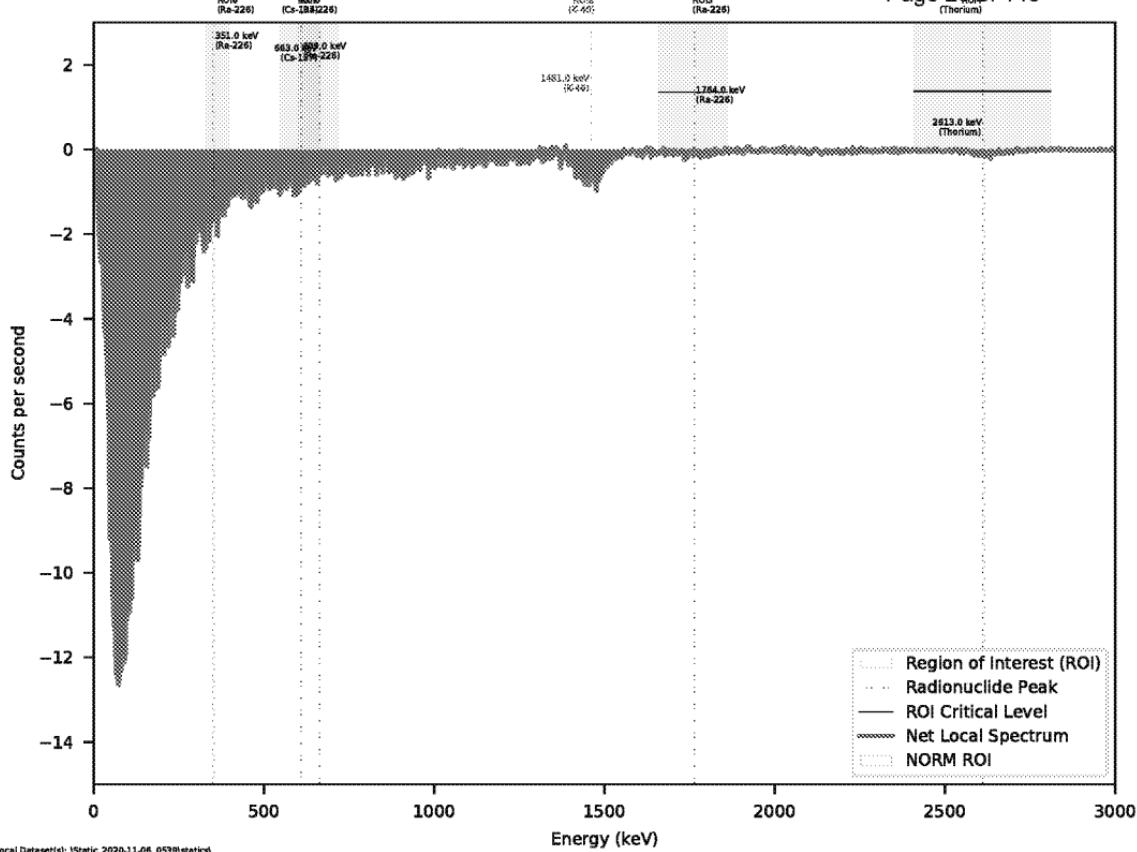
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Net Gamma Spectrum, Static Location: 16

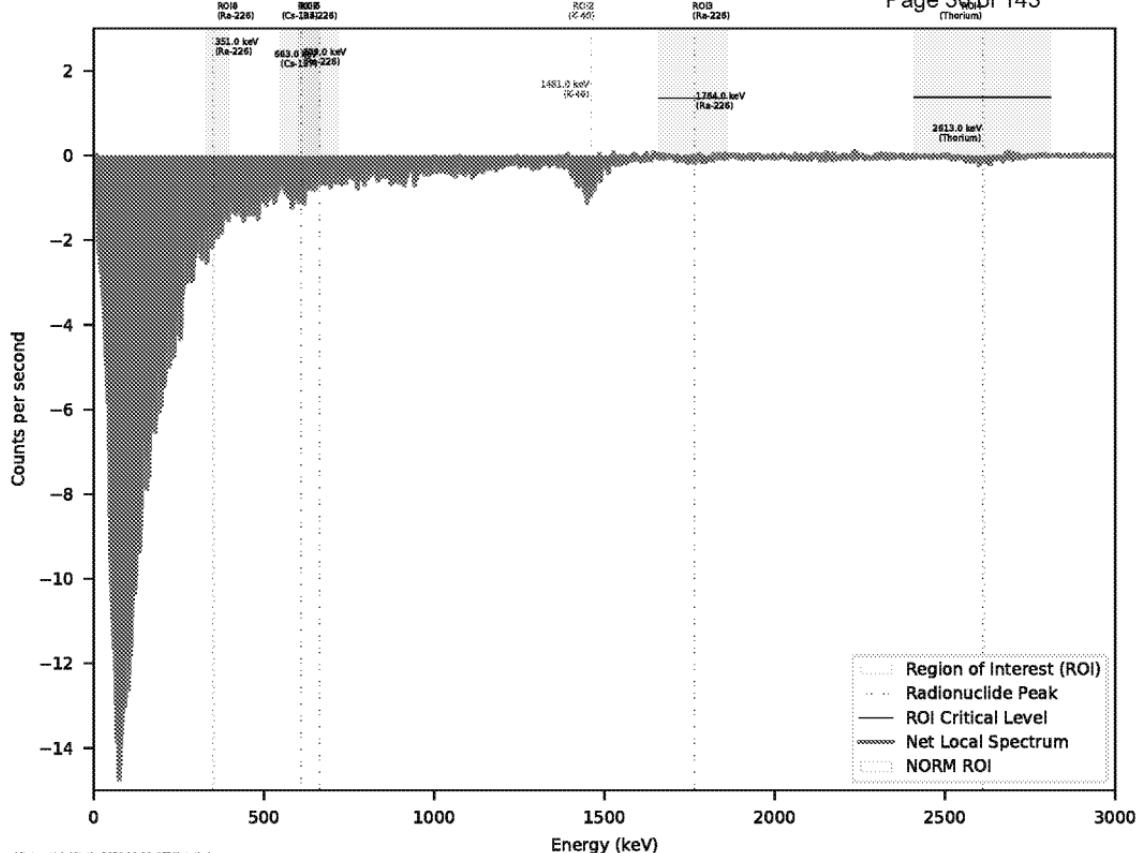
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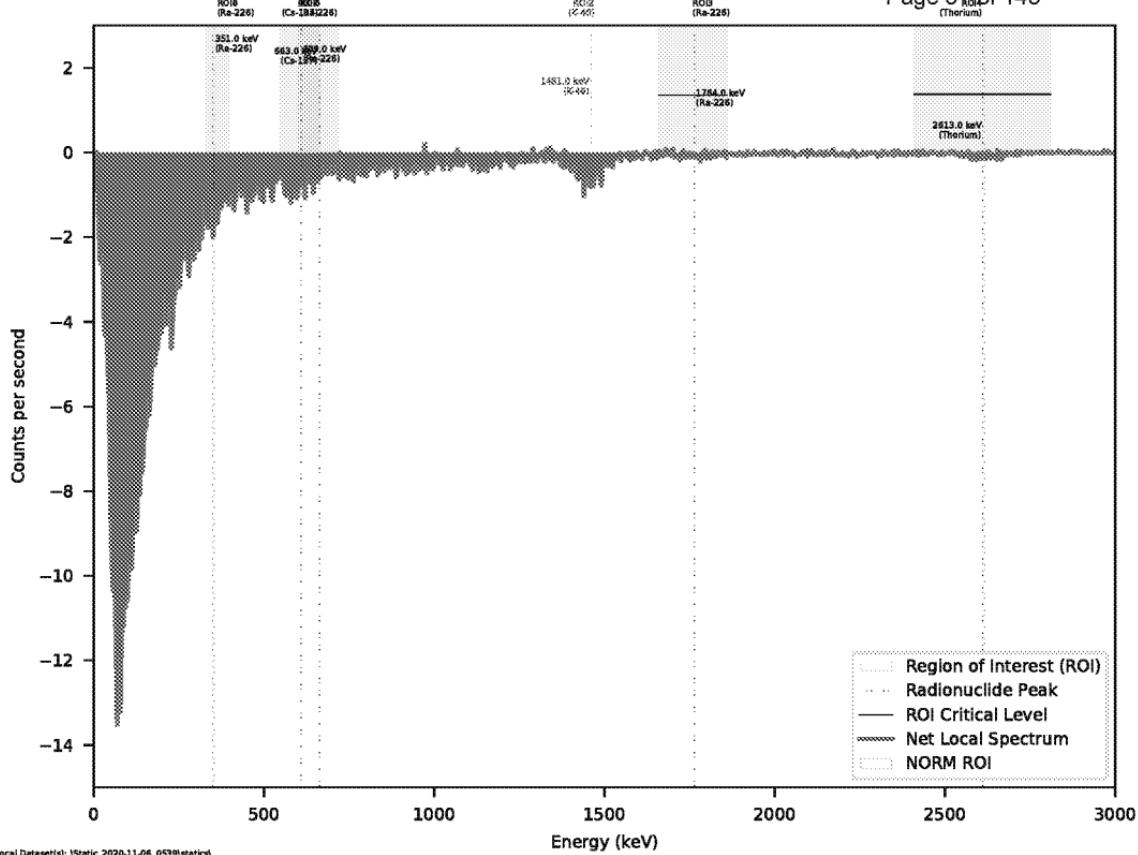
Net Gamma Spectrum, Static Location: 17

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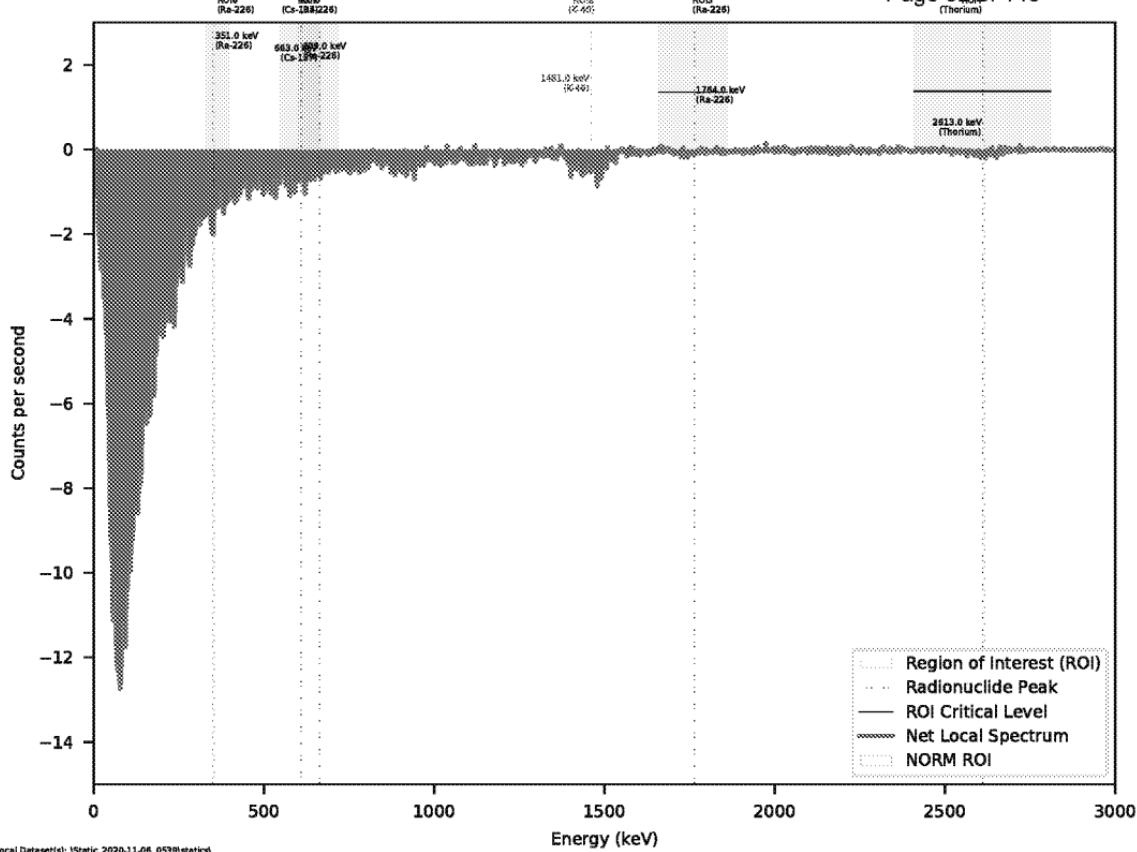
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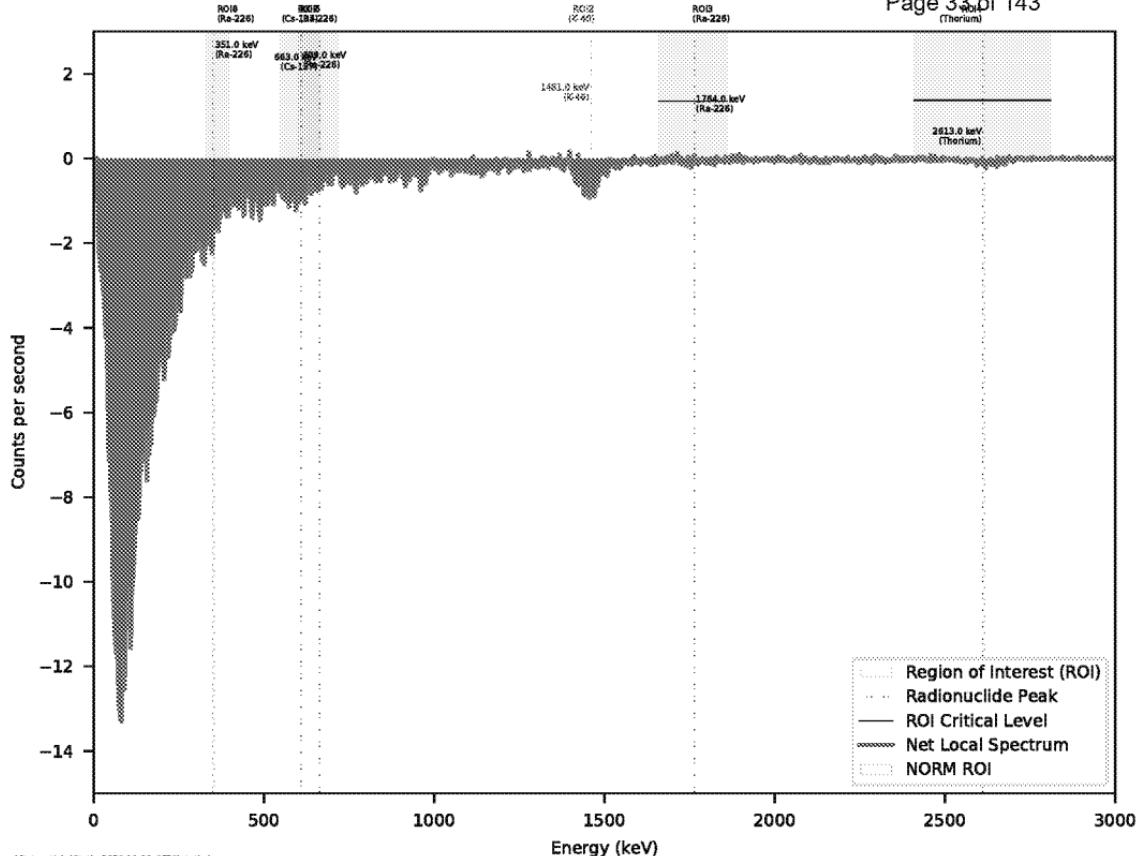
Net Gamma Spectrum, Static Location: 19

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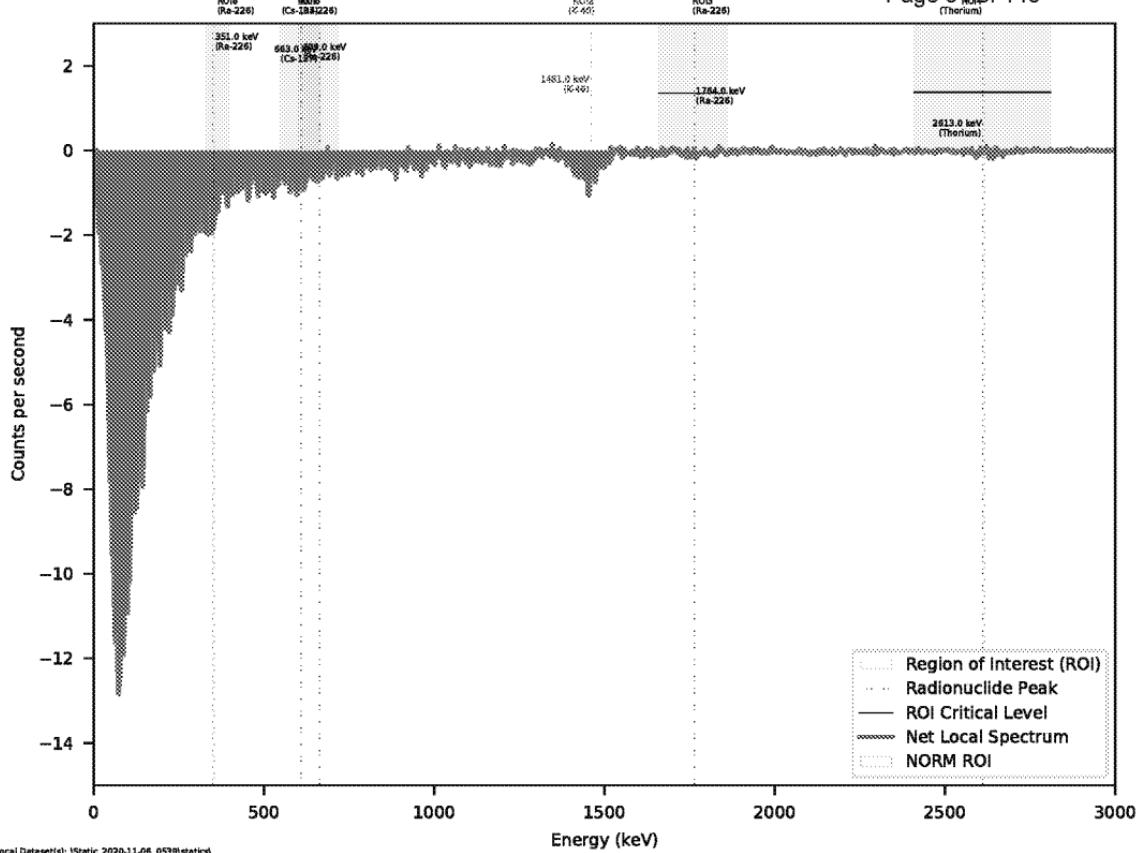
Net Gamma Spectrum, Static Location: 20

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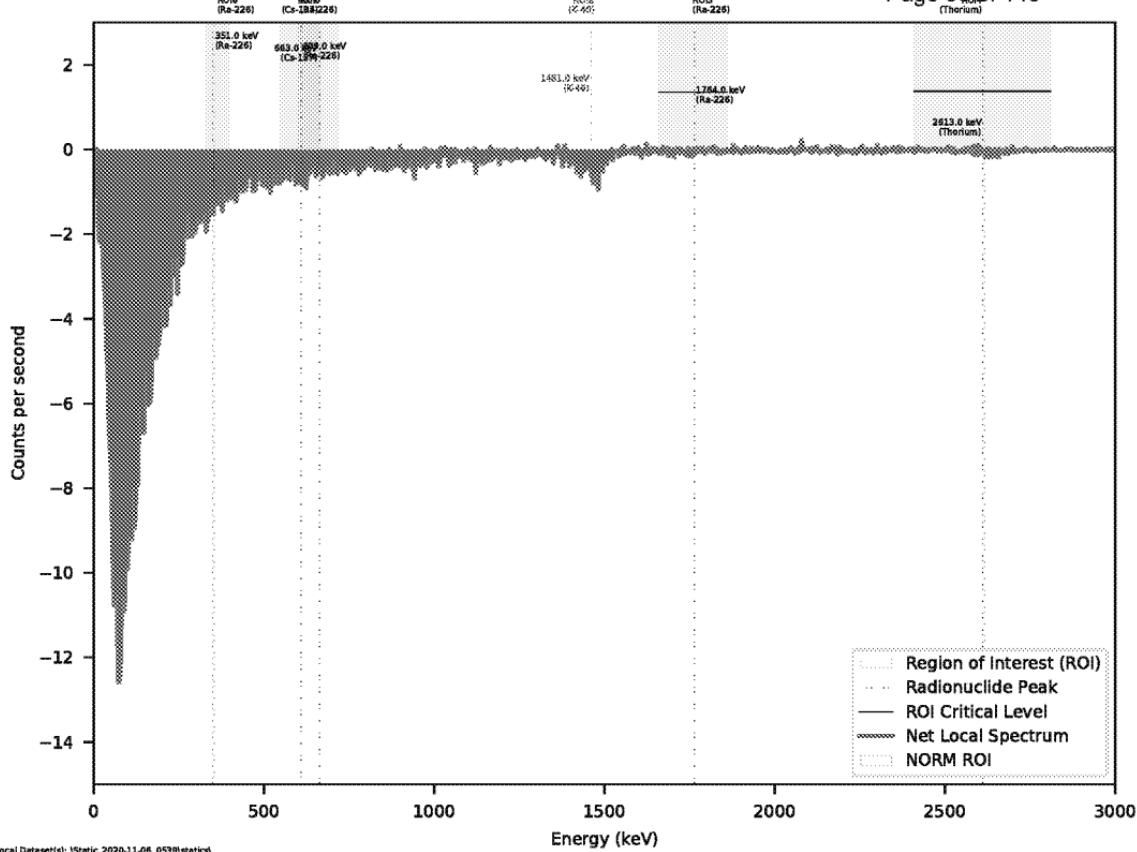
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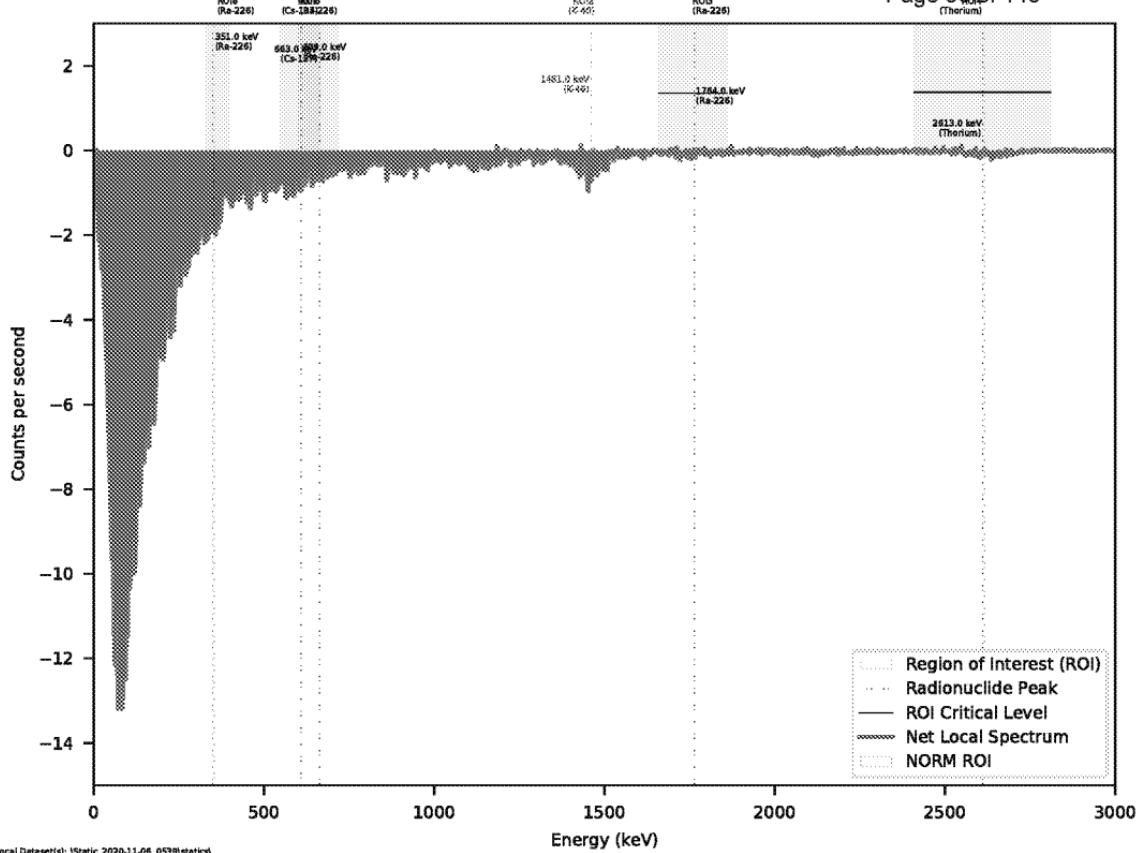
Net Gamma Spectrum, Static Location: 22

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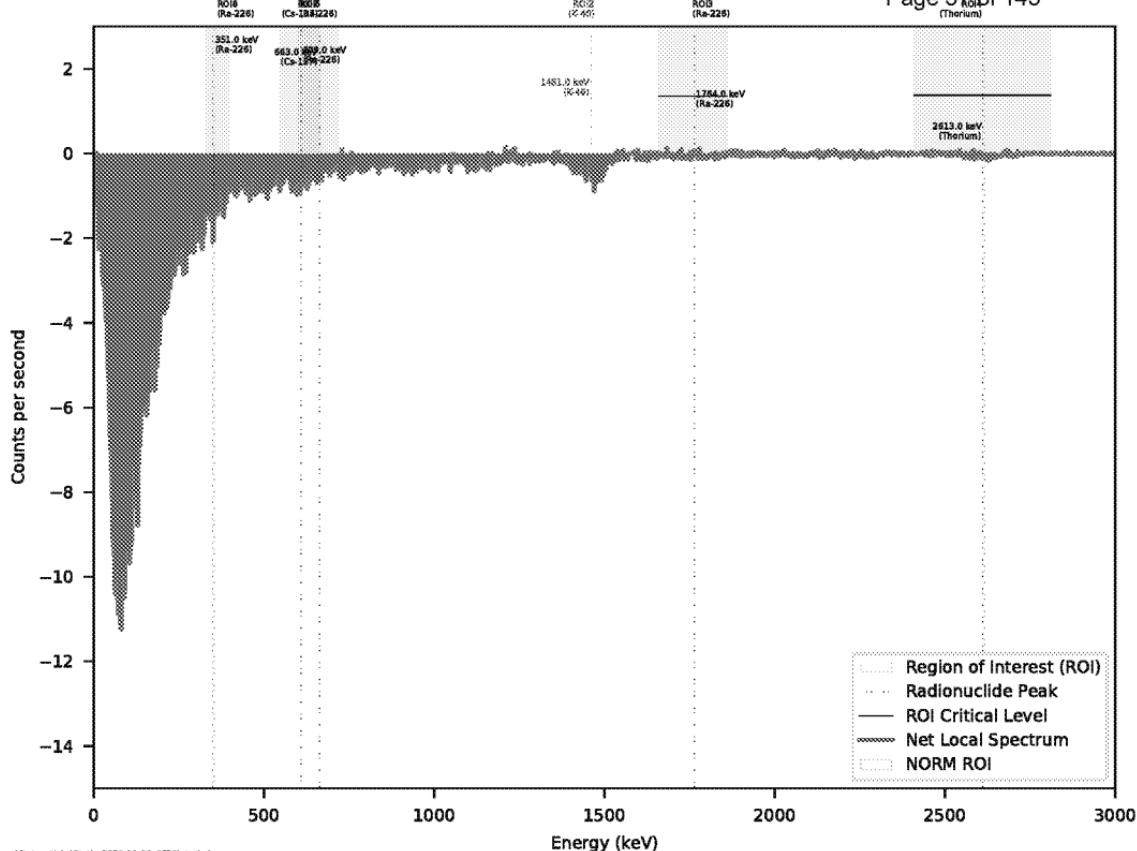
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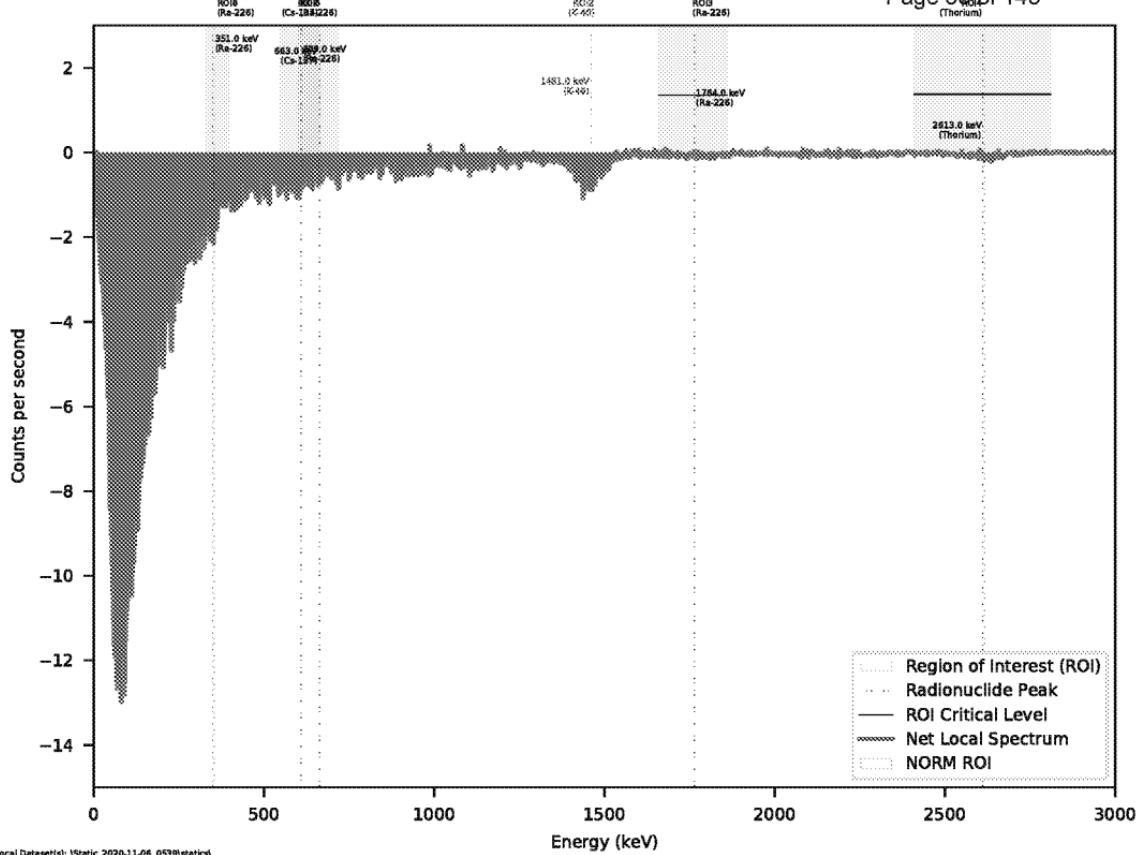
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Net Gamma Spectrum, Static Location: 25

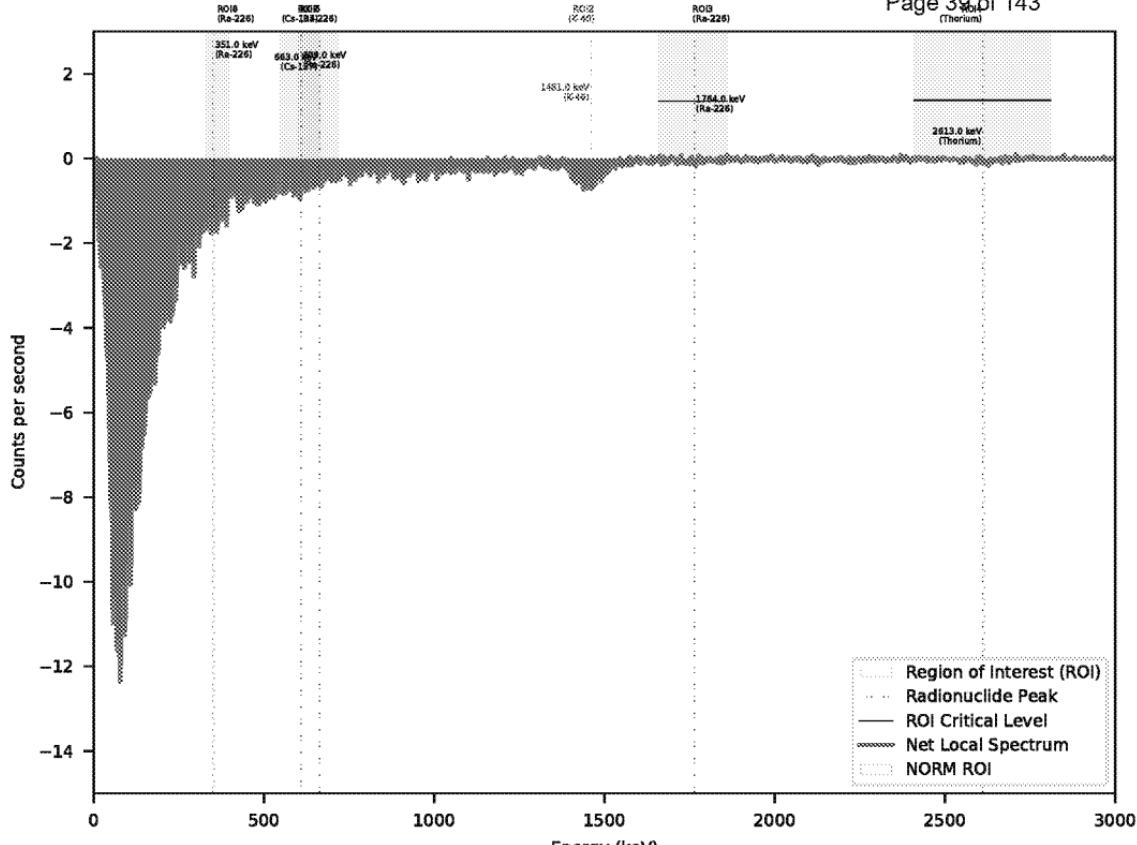
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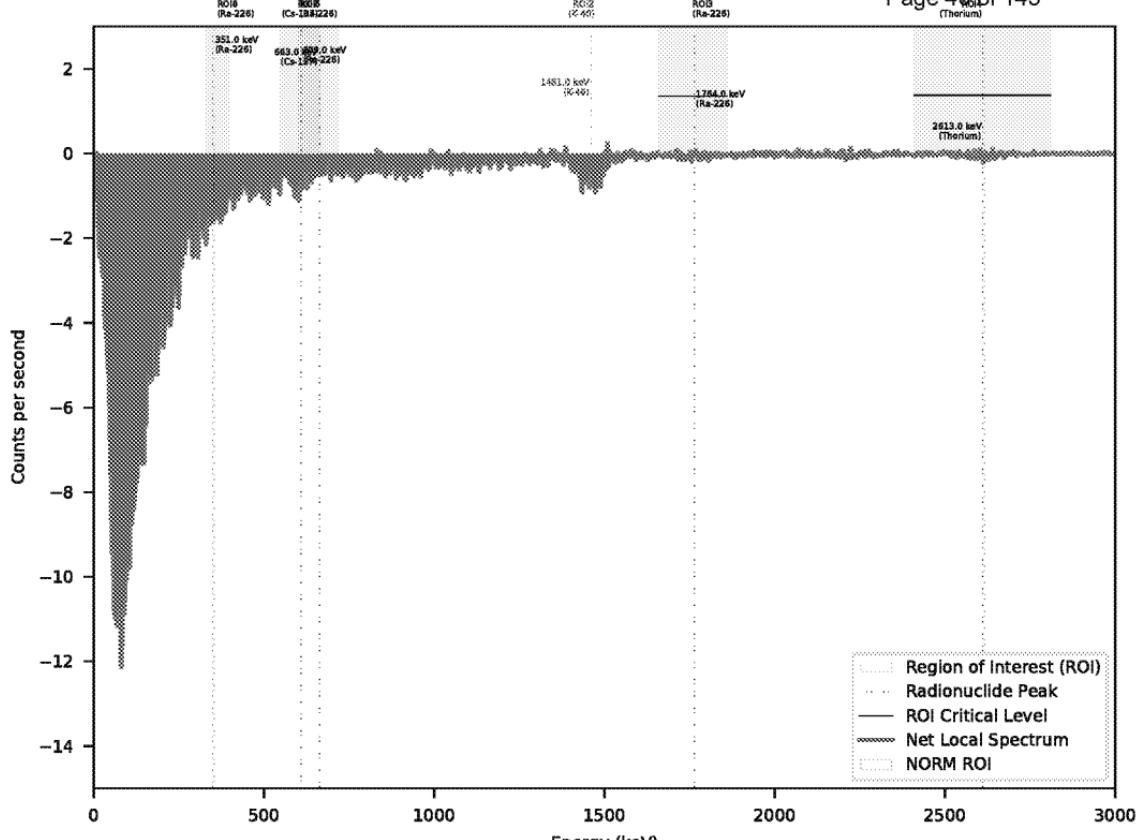
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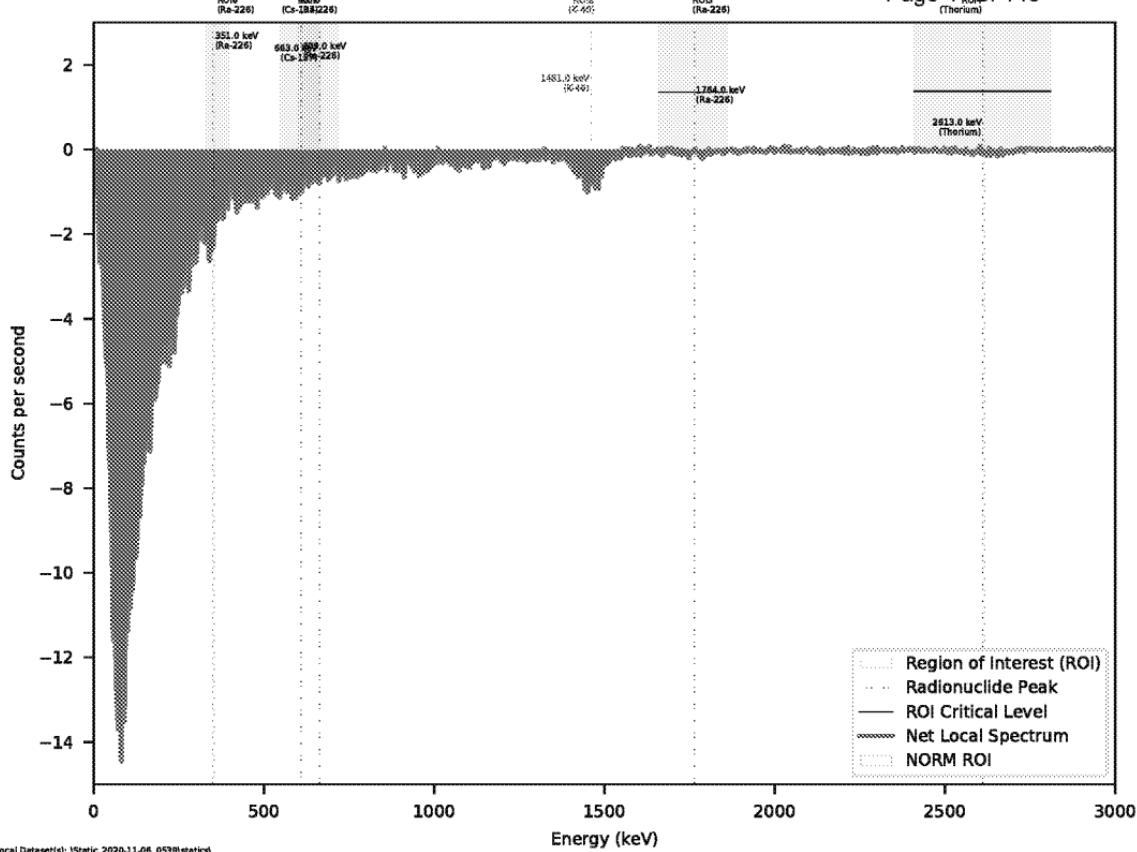
Net Gamma Spectrum, Static Location: 27

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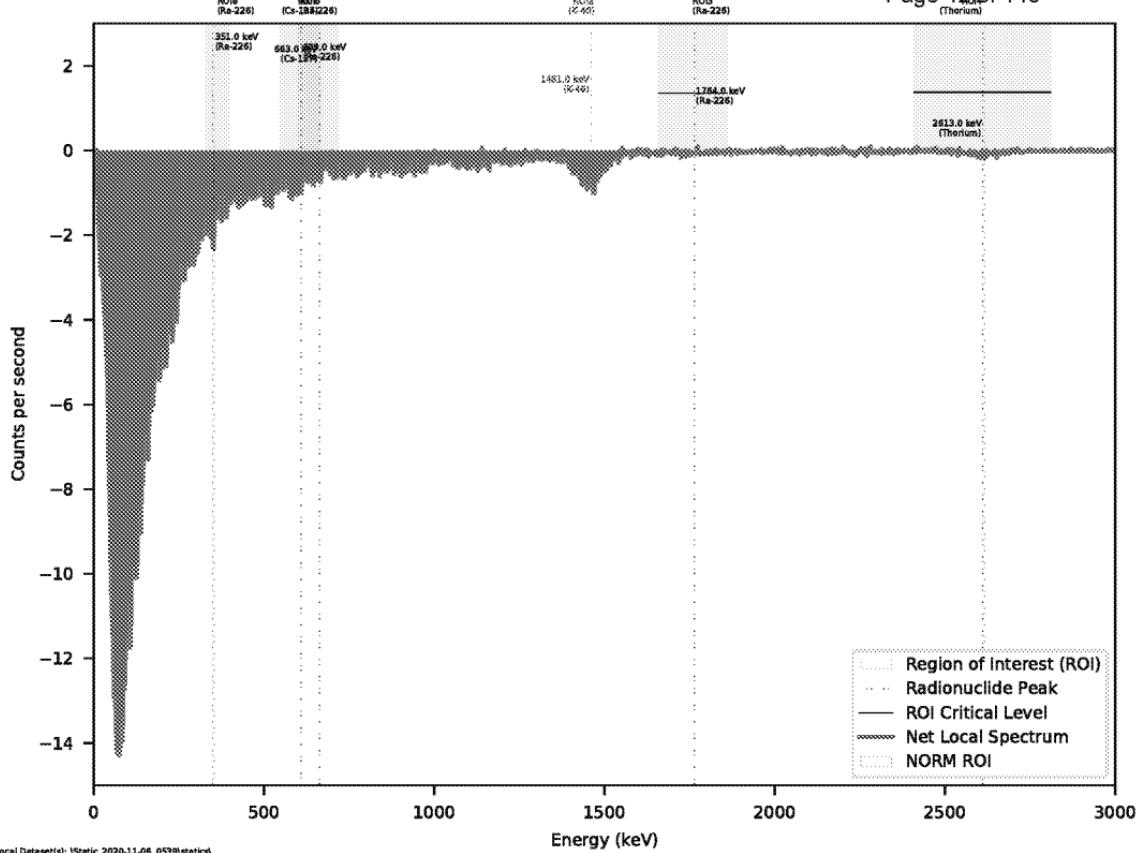
Net Gamma Spectrum, Static Location: 28

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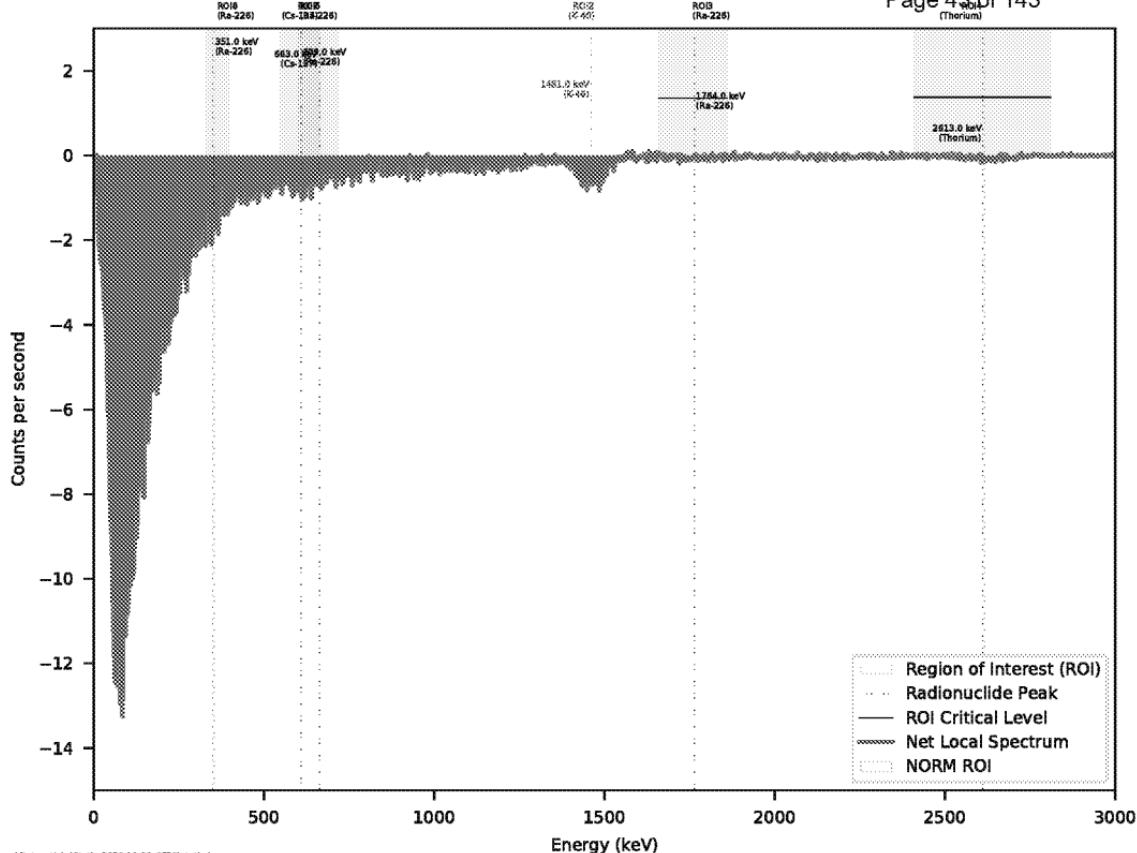
Net Gamma Spectrum, Static Location: 29

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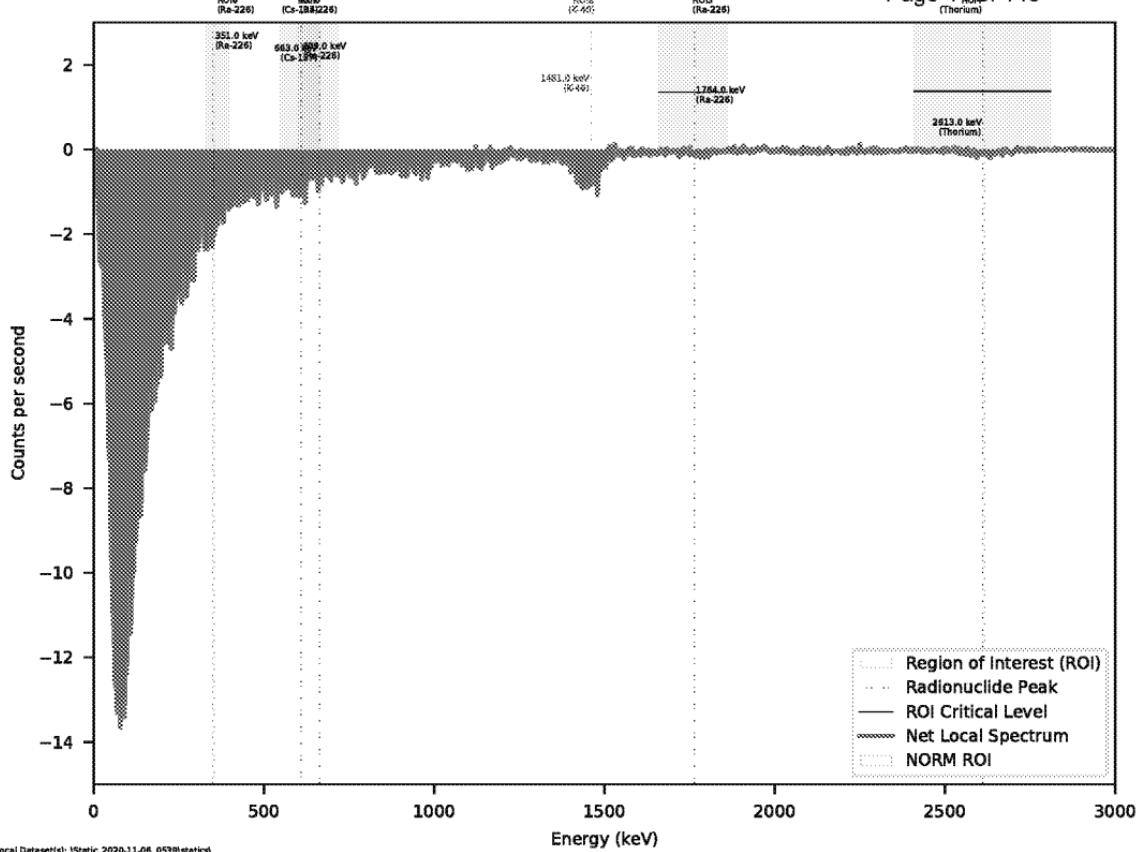
Net Gamma Spectrum, Static Location: 30

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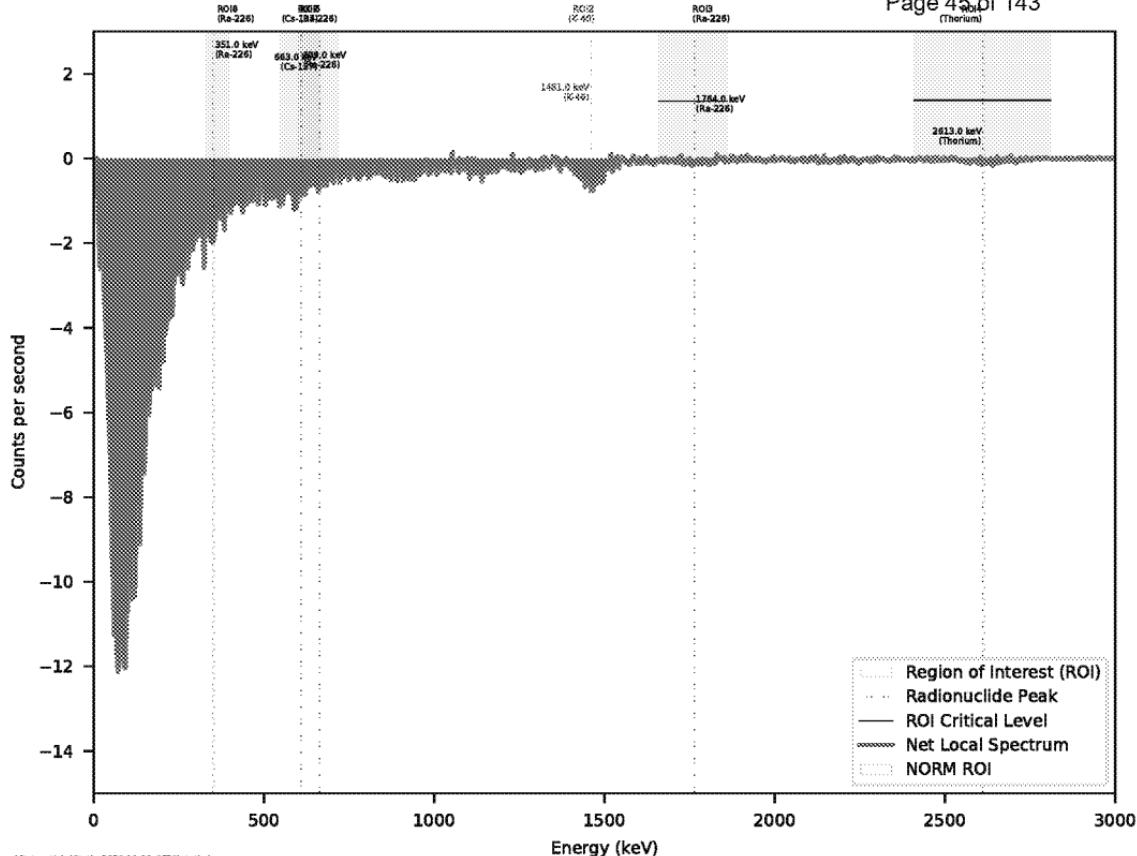
Net Gamma Spectrum, Static Location: 31

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Net Gamma Spectrum, Static Location: 32

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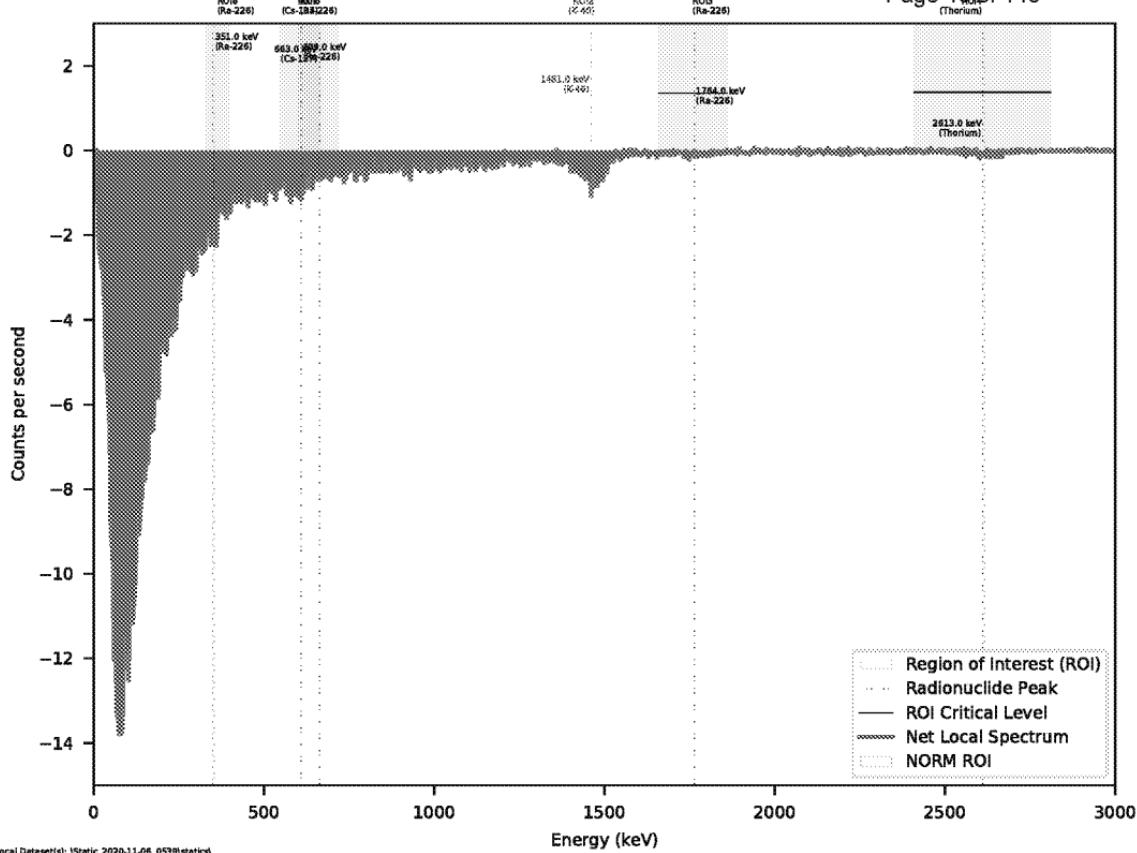
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Background Dataset(s): RSII_SoilRBA_Static.csv

Local Coordinates (Longitude, Latitude): -122.3639729347223, 37.723844705555556

ED_006360A_00000405-00045

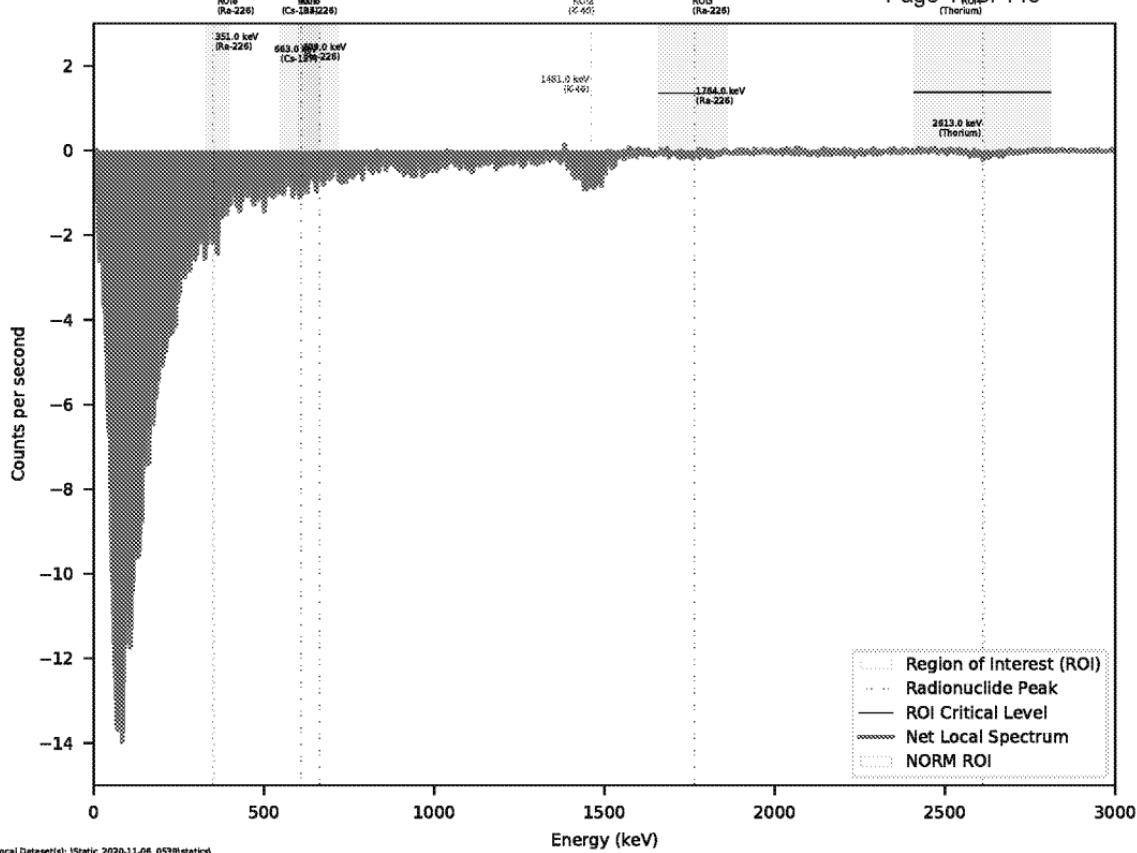
Net Gamma Spectrum, Static Location: 33

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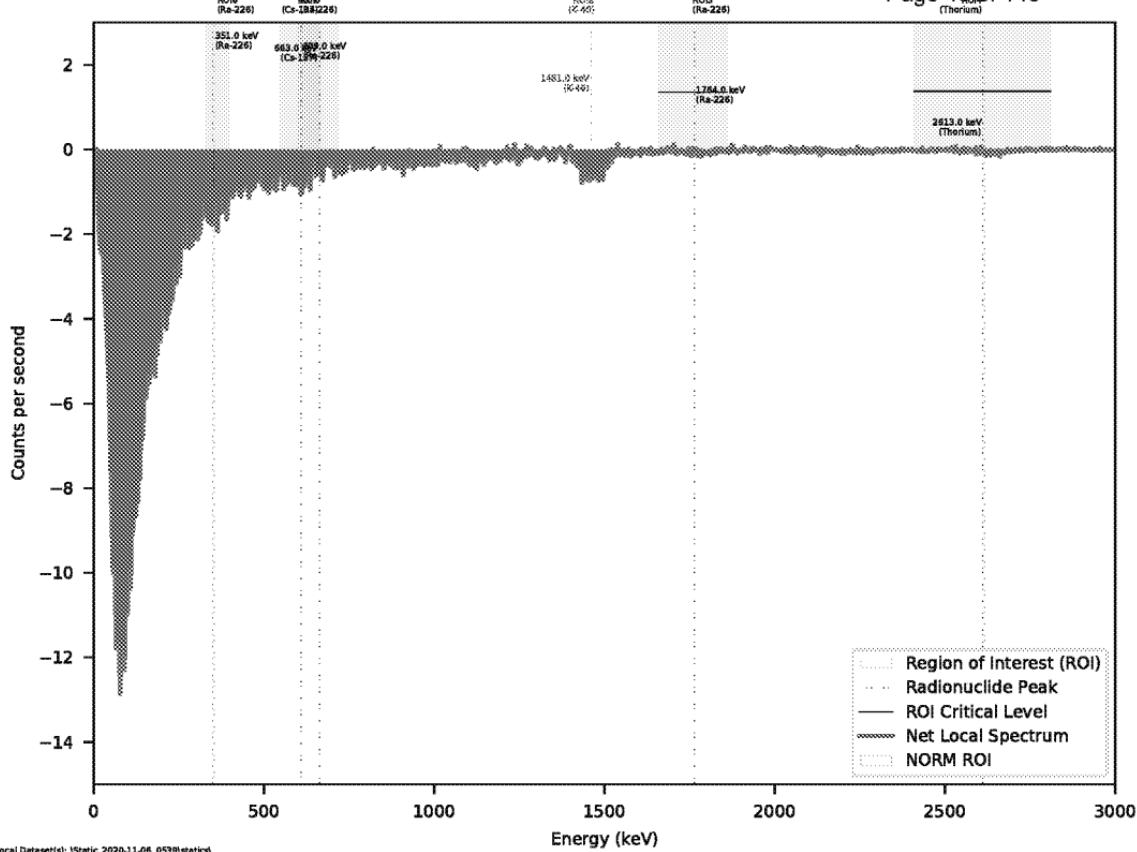
Net Gamma Spectrum, Static Location: 34

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Net Gamma Spectrum, Static Location: 35

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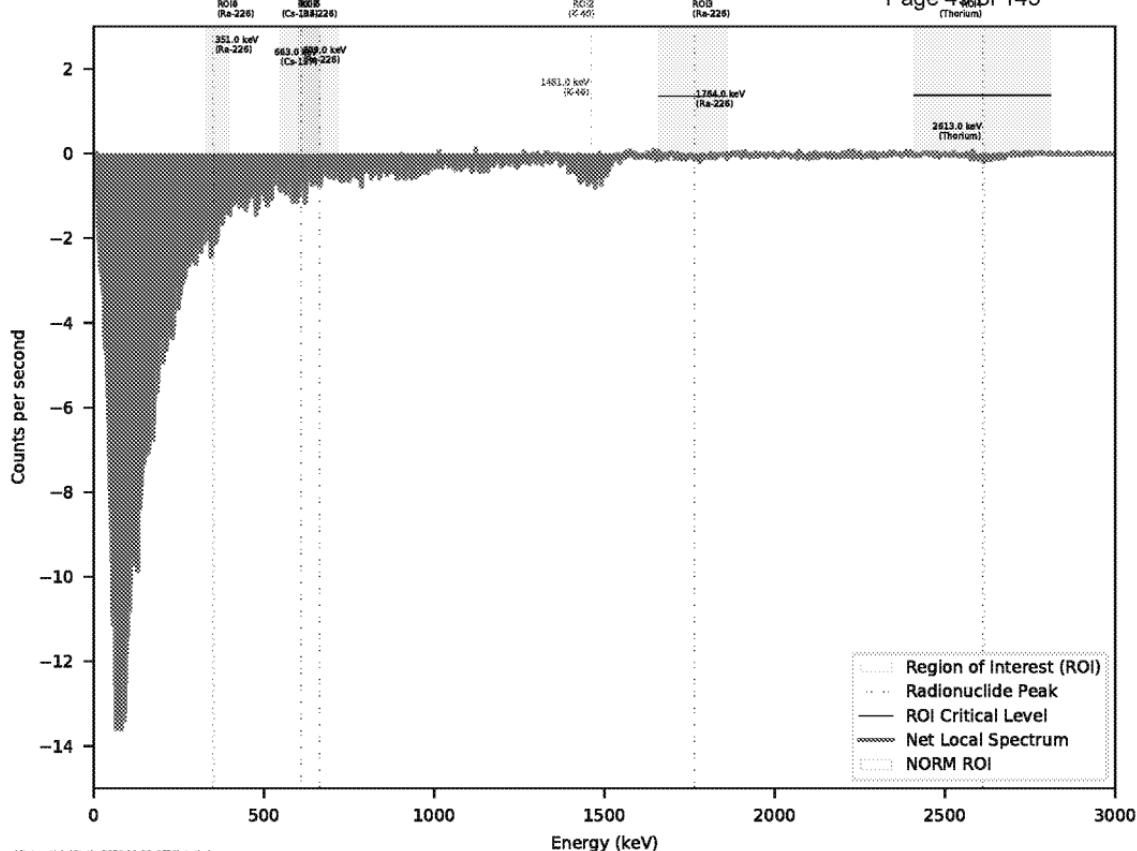


ED_006360A_00000405-00048

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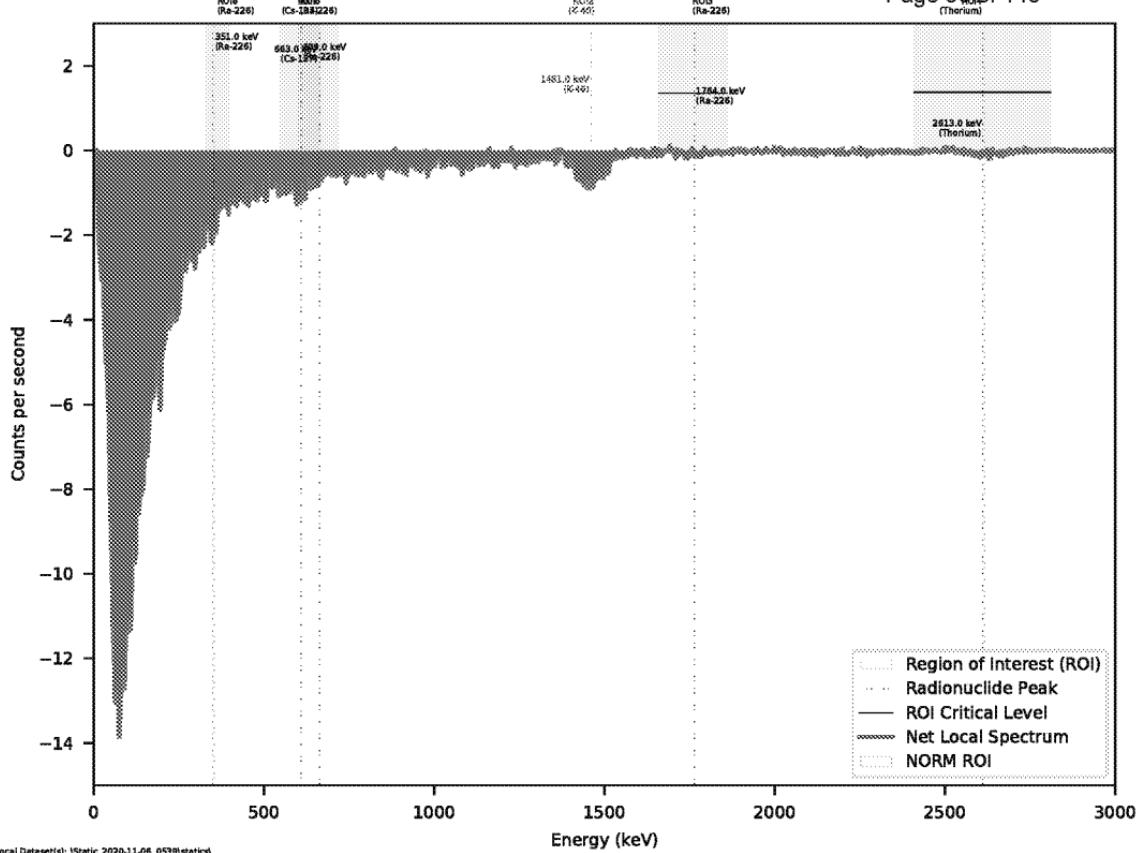
Net Gamma Spectrum, Static Location: 36

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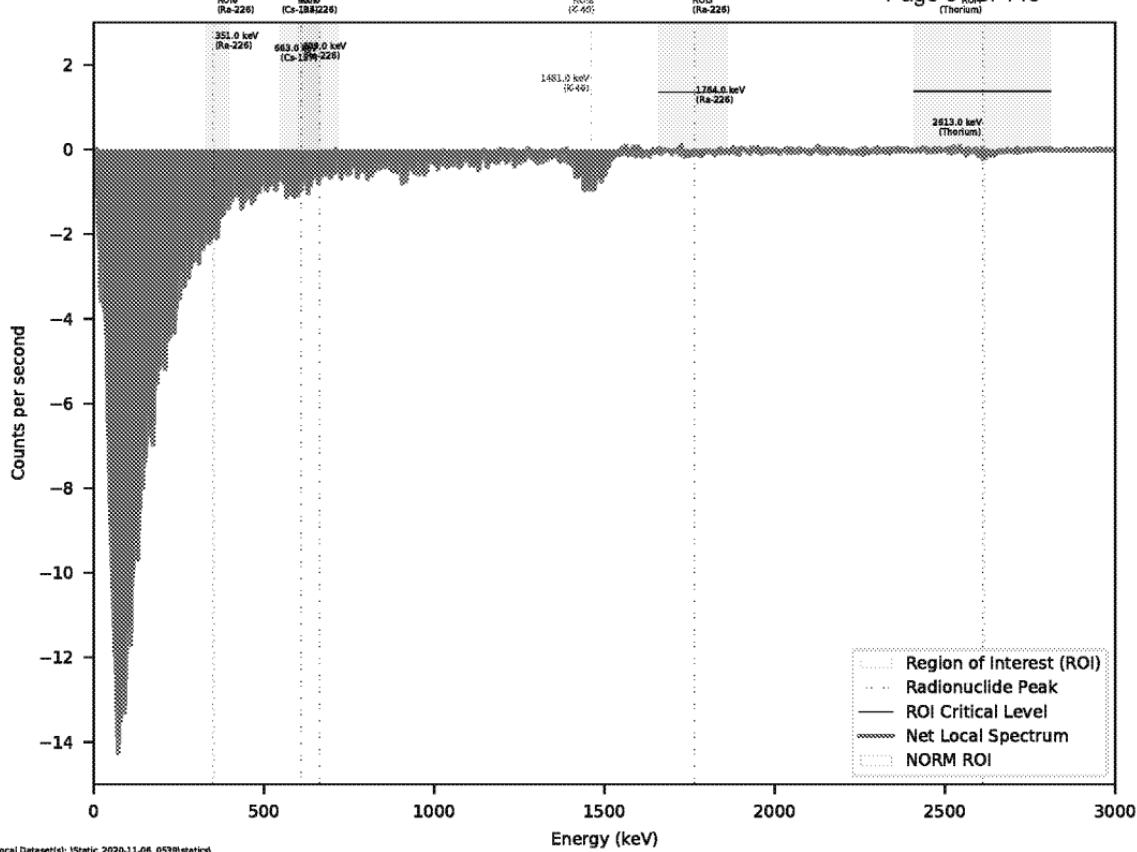
Net Gamma Spectrum, Static Location: 37

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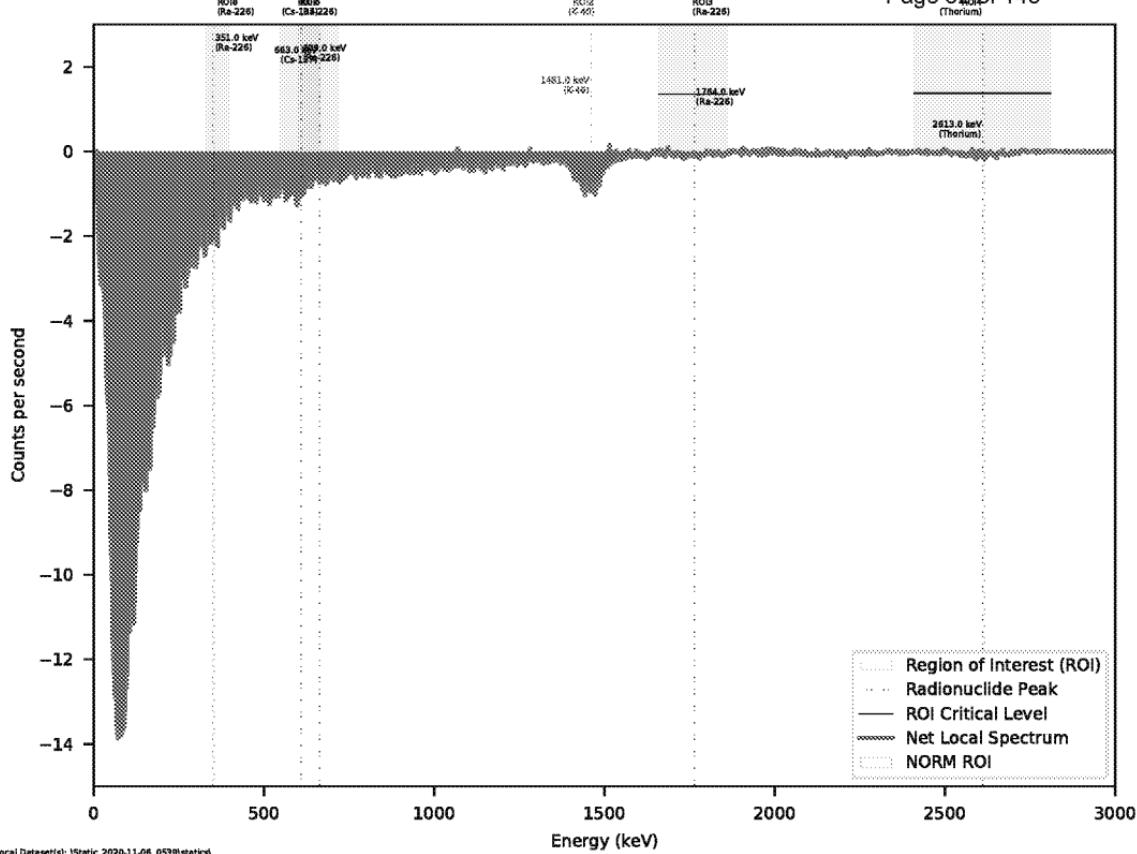
Net Gamma Spectrum, Static Location: 38

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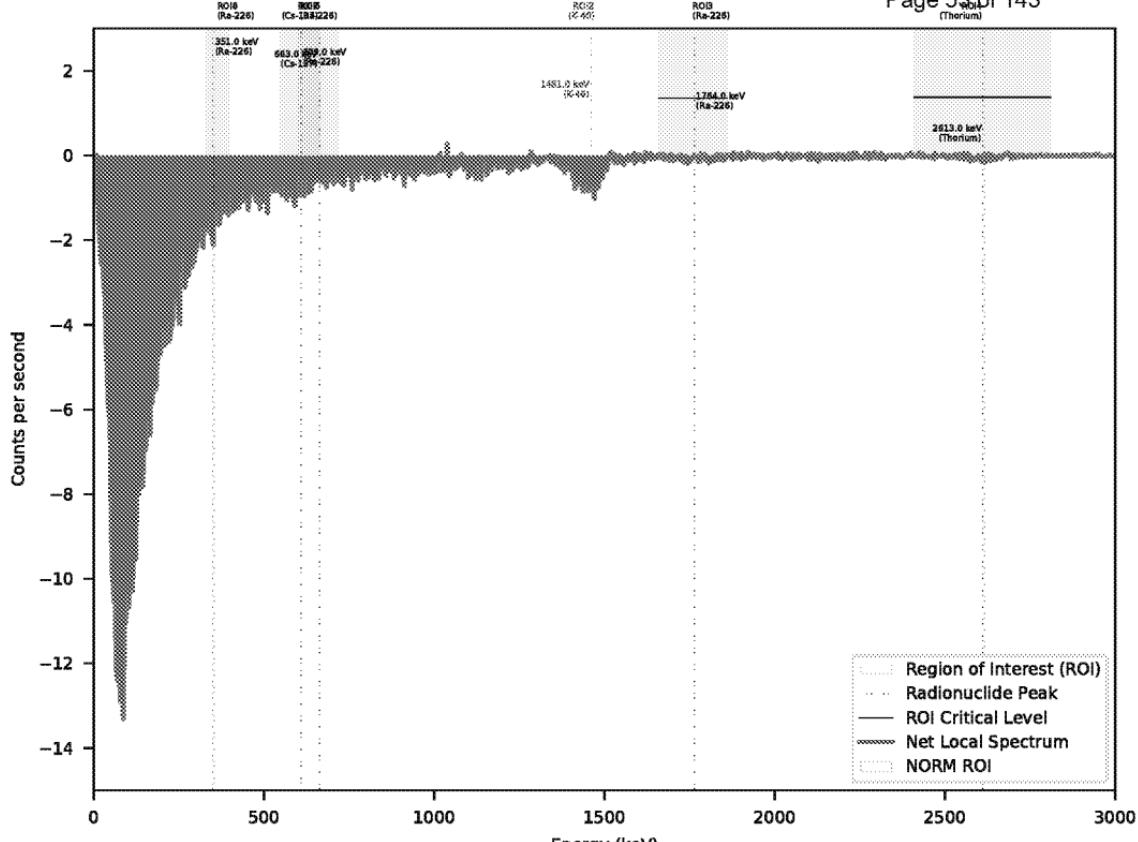
Net Gamma Spectrum, Static Location: 39

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Net Gamma Spectrum, Static Location: 40

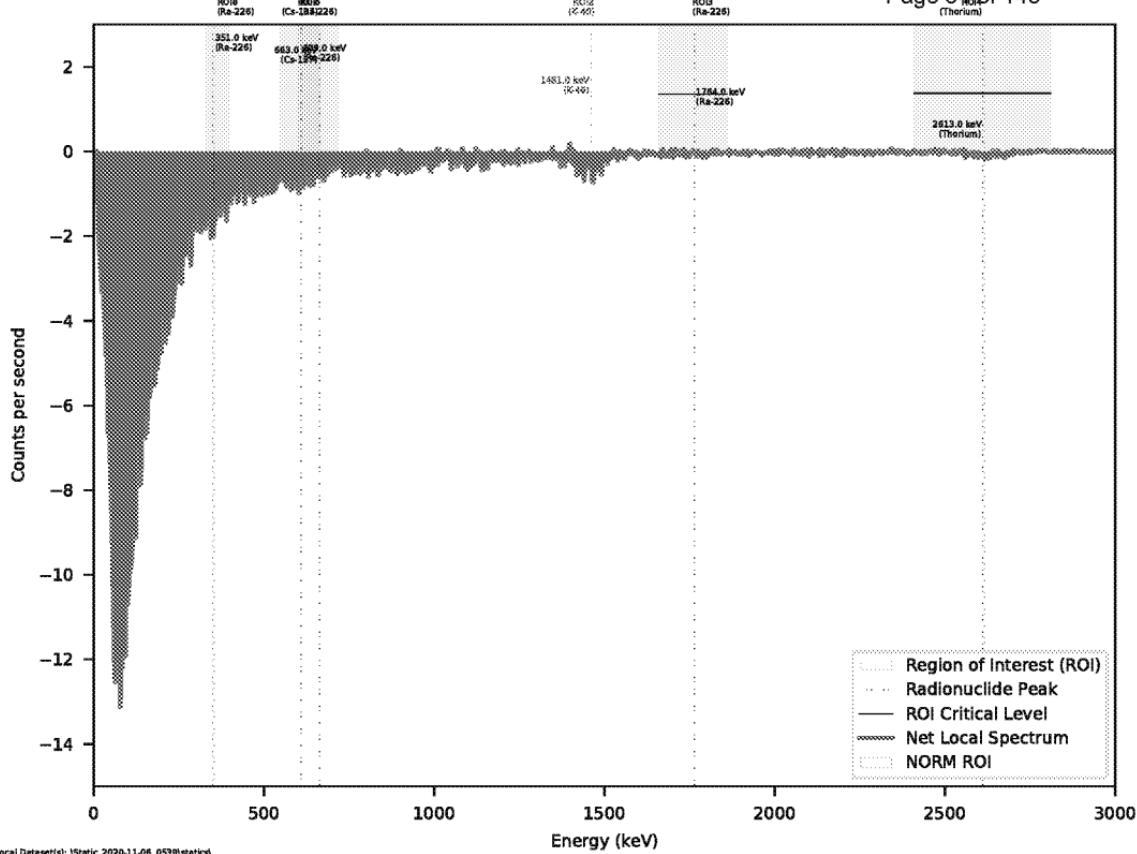
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ED_006360A_00000405-00053

Net Gamma Spectrum, Static Location: 41

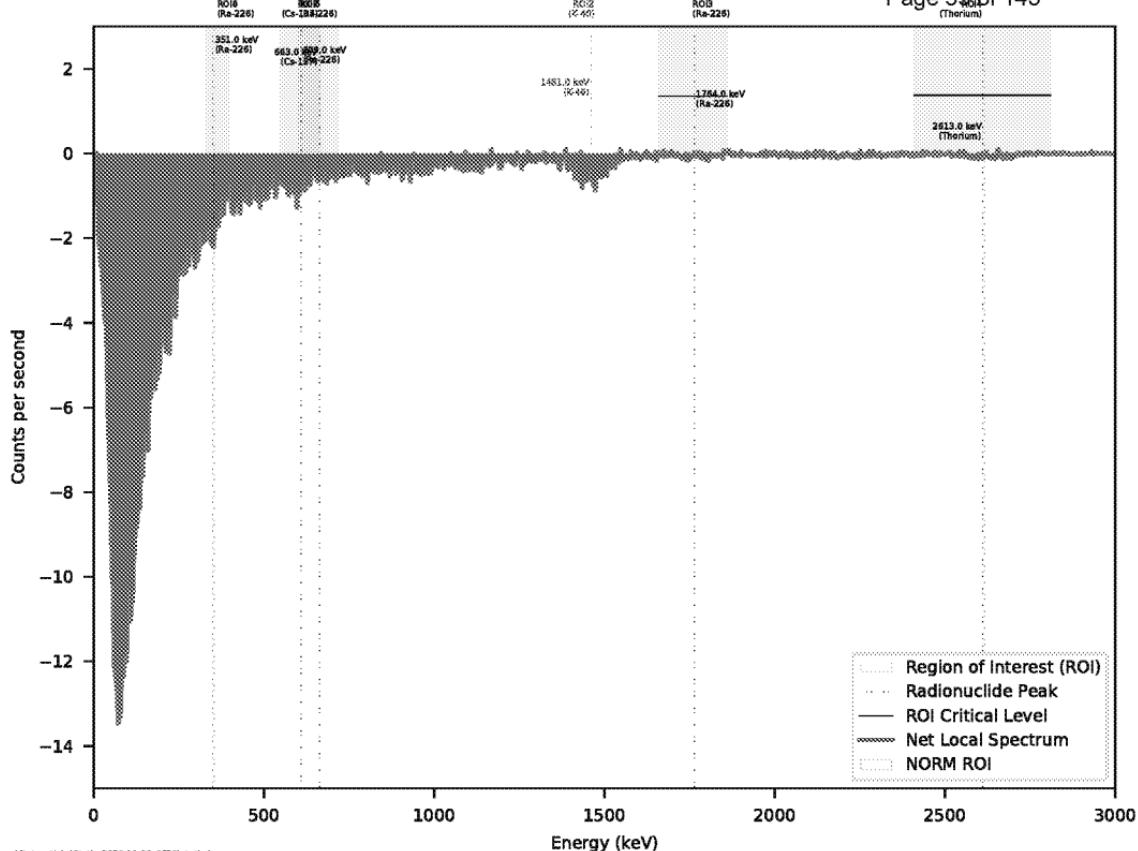
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ED_006360A_00000405-00054

Net Gamma Spectrum, Static Location: 42

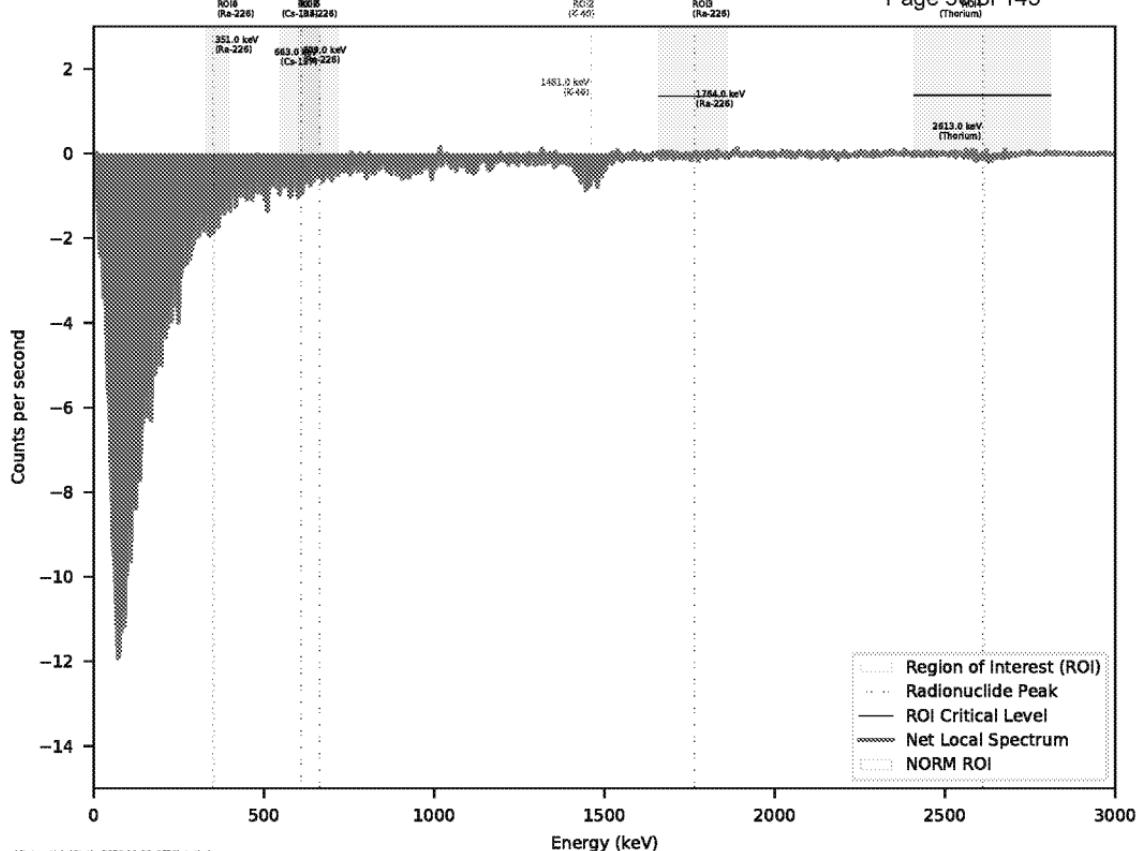
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ED_006360A_00000405-00055

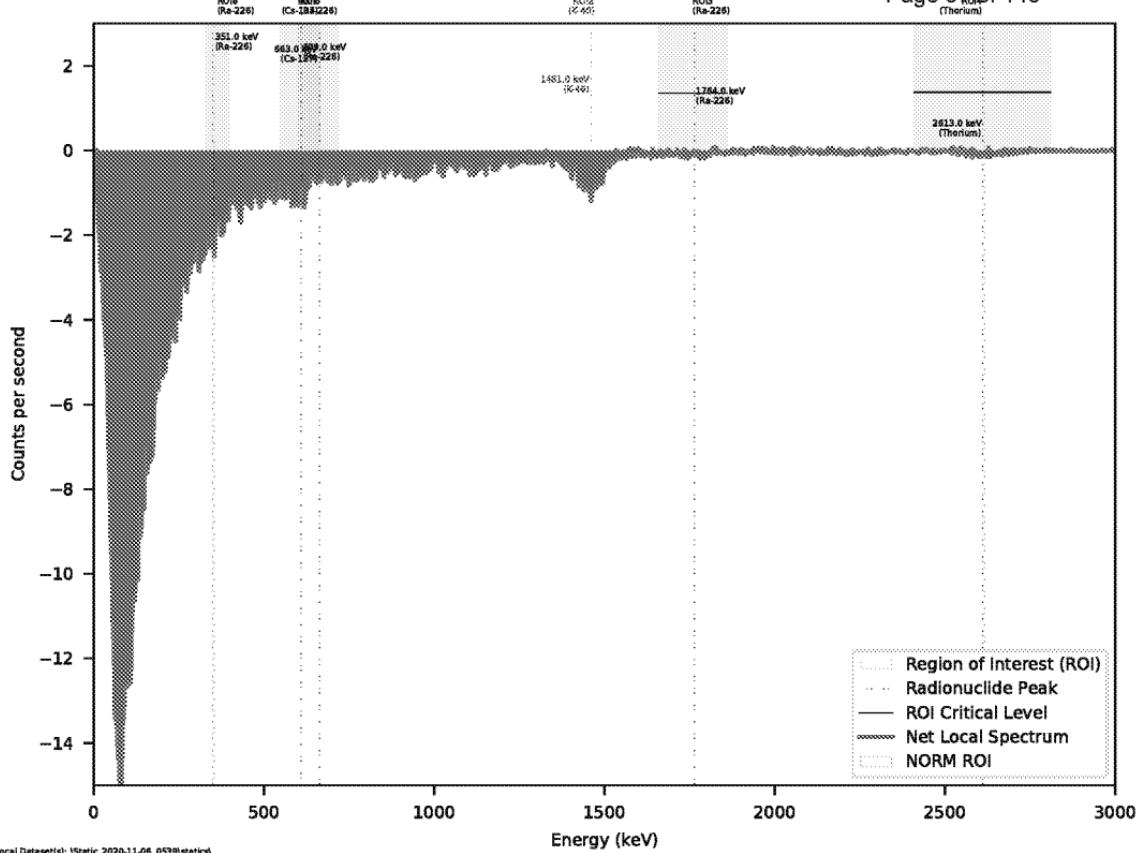
Net Gamma Spectrum, Static Location: 43

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Net Gamma Spectrum, Static Location: 44

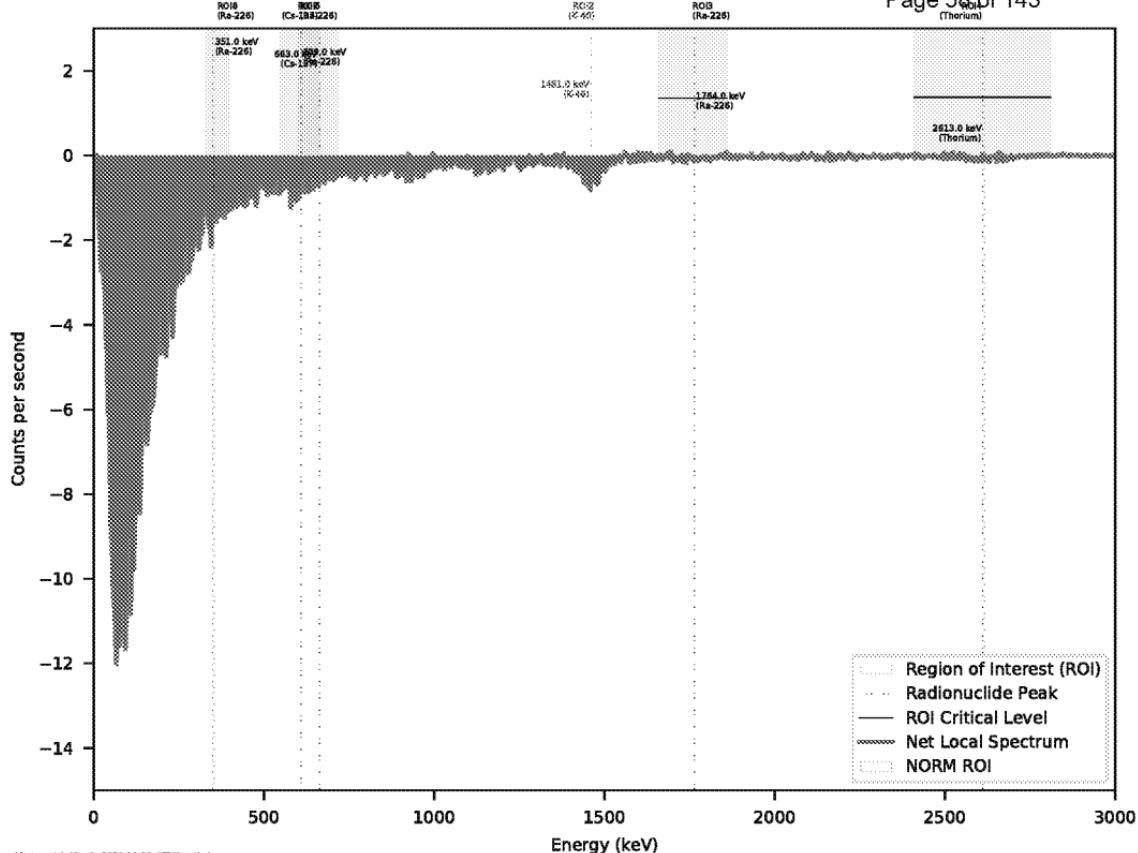
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ED_006360A_00000405-00057

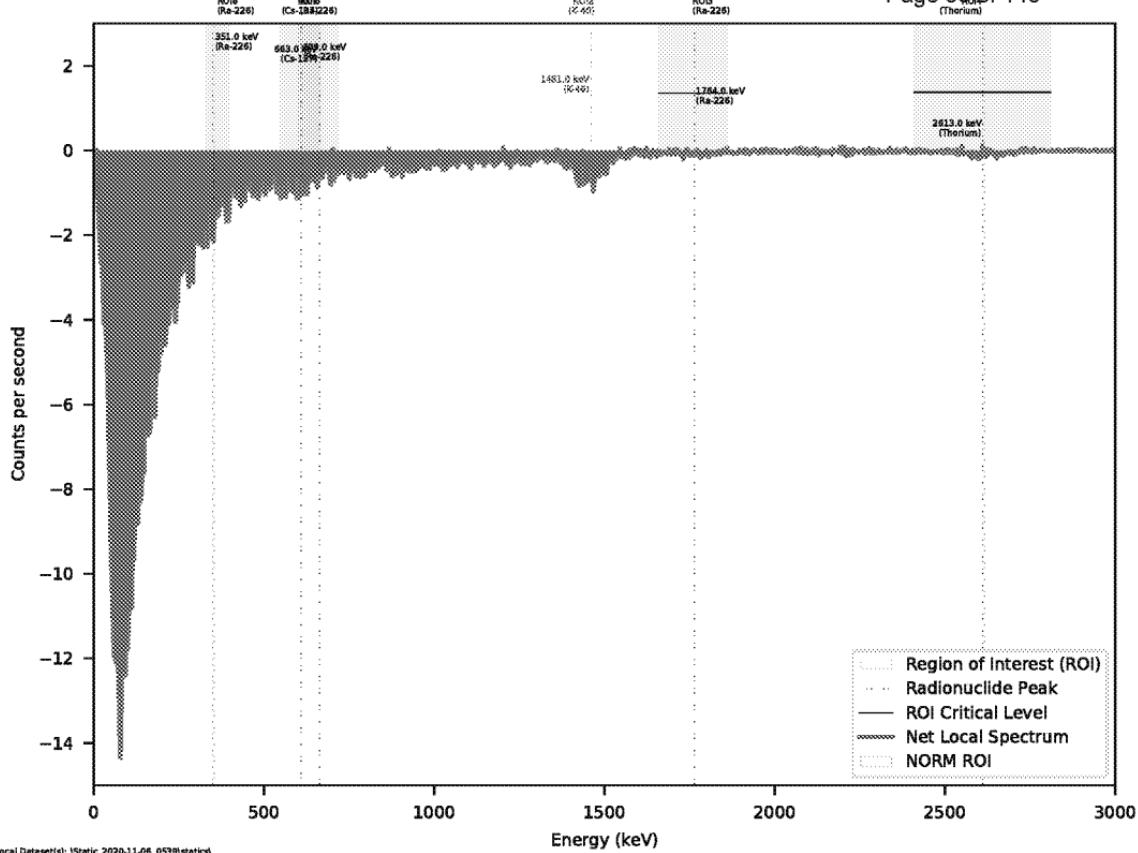
Net Gamma Spectrum, Static Location: 45

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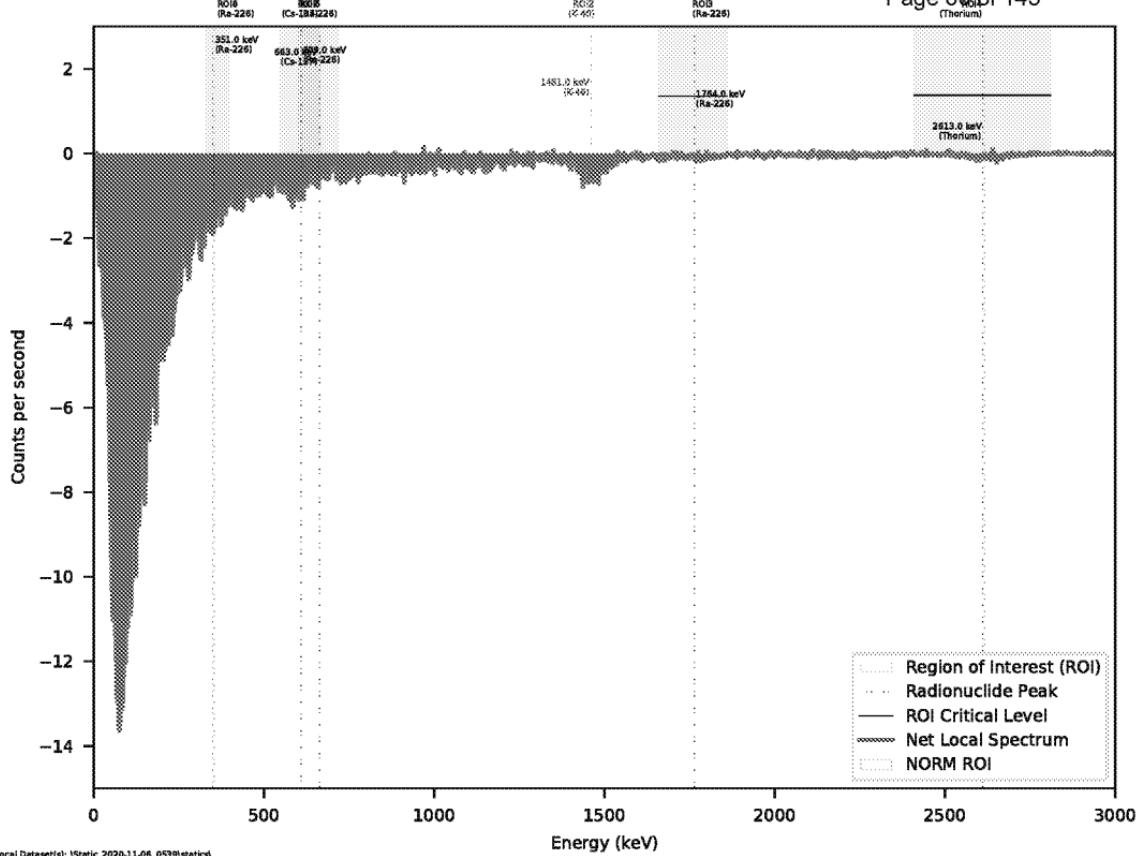
Net Gamma Spectrum, Static Location: 46

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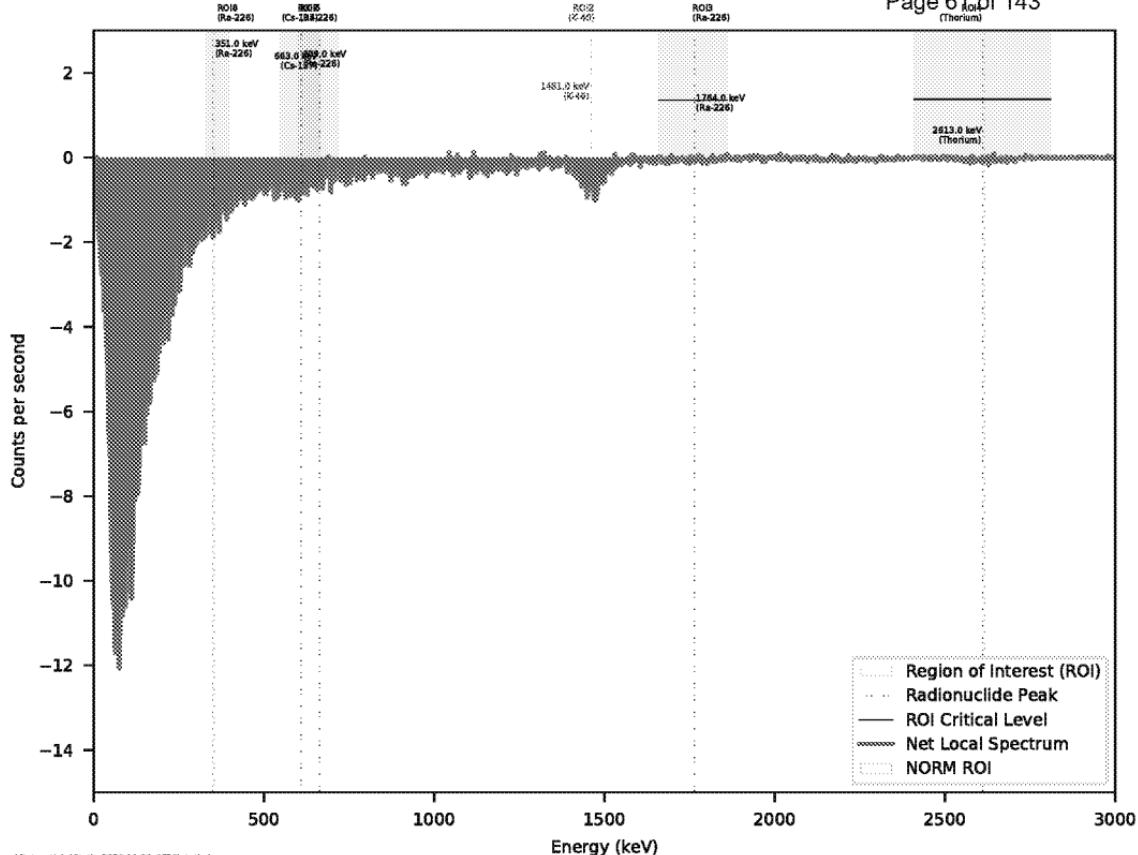
Net Gamma Spectrum, Static Location: 47

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Net Gamma Spectrum, Static Location: 48

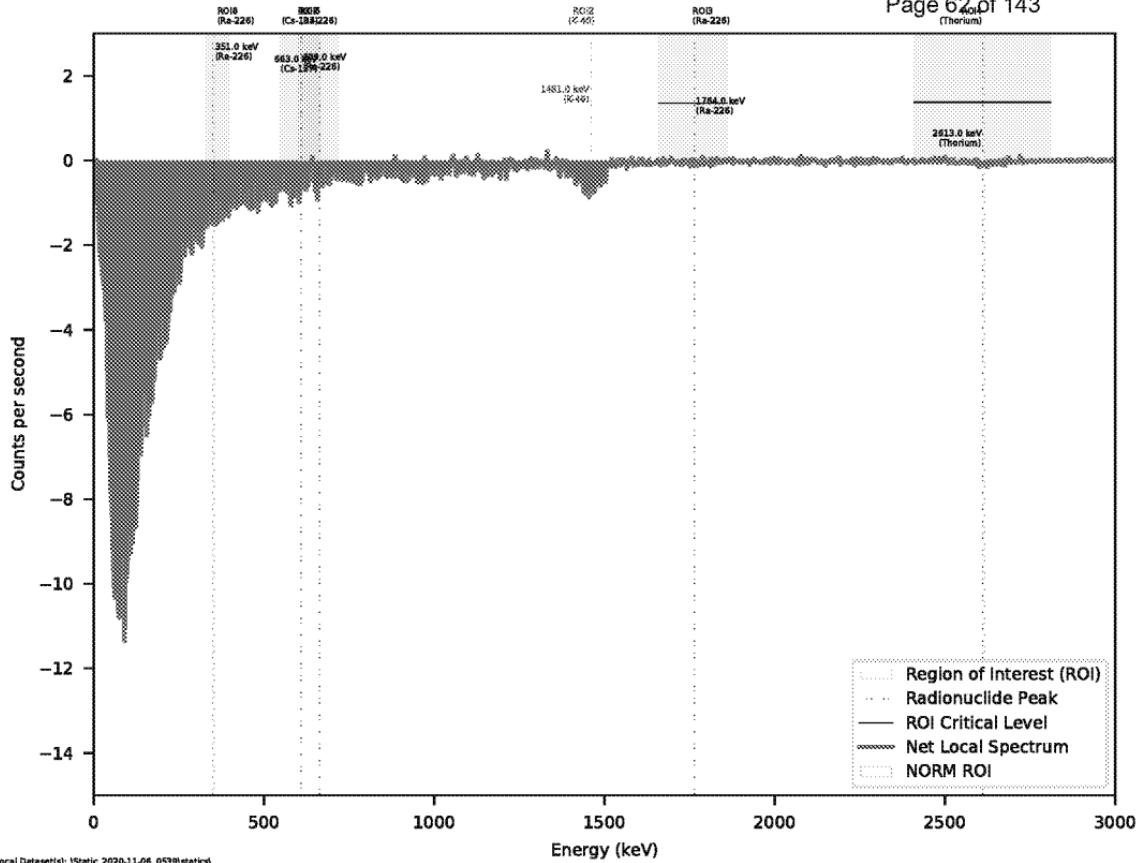
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ED_006360A_00000405-00061

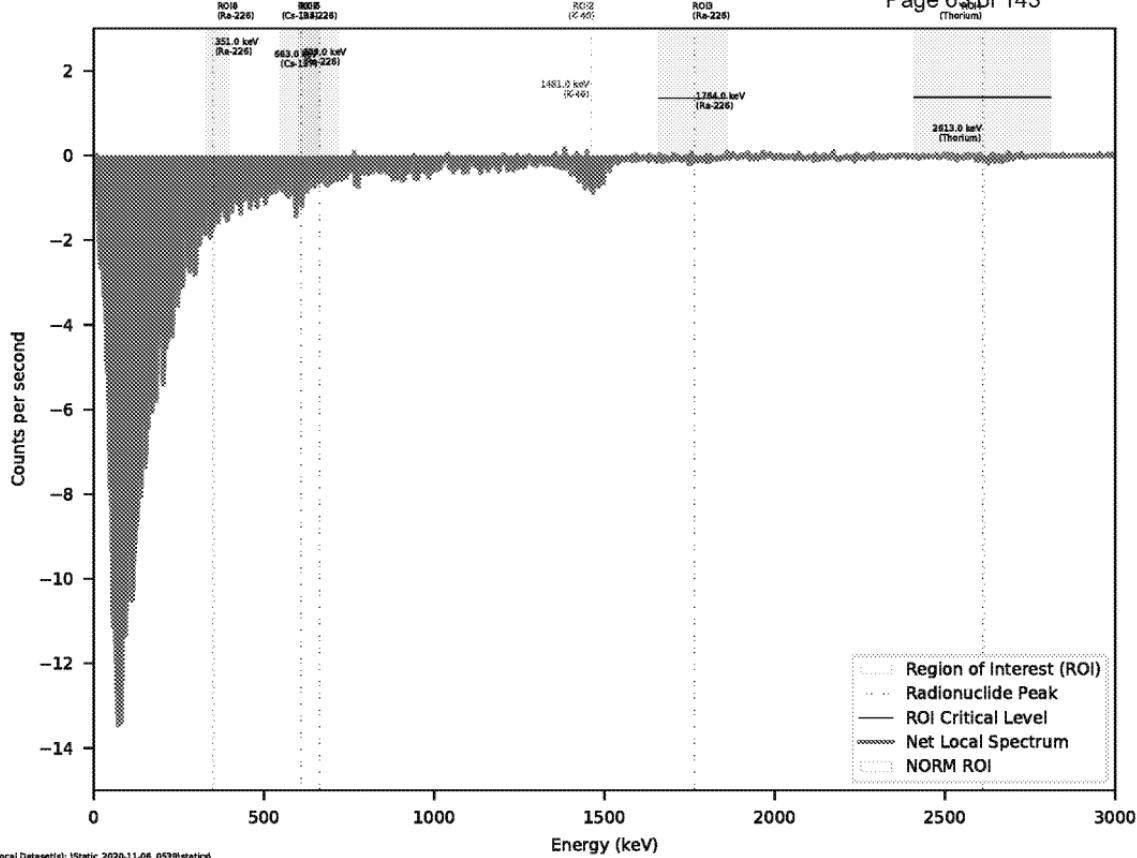
Net Gamma Spectrum, Static Location: 49

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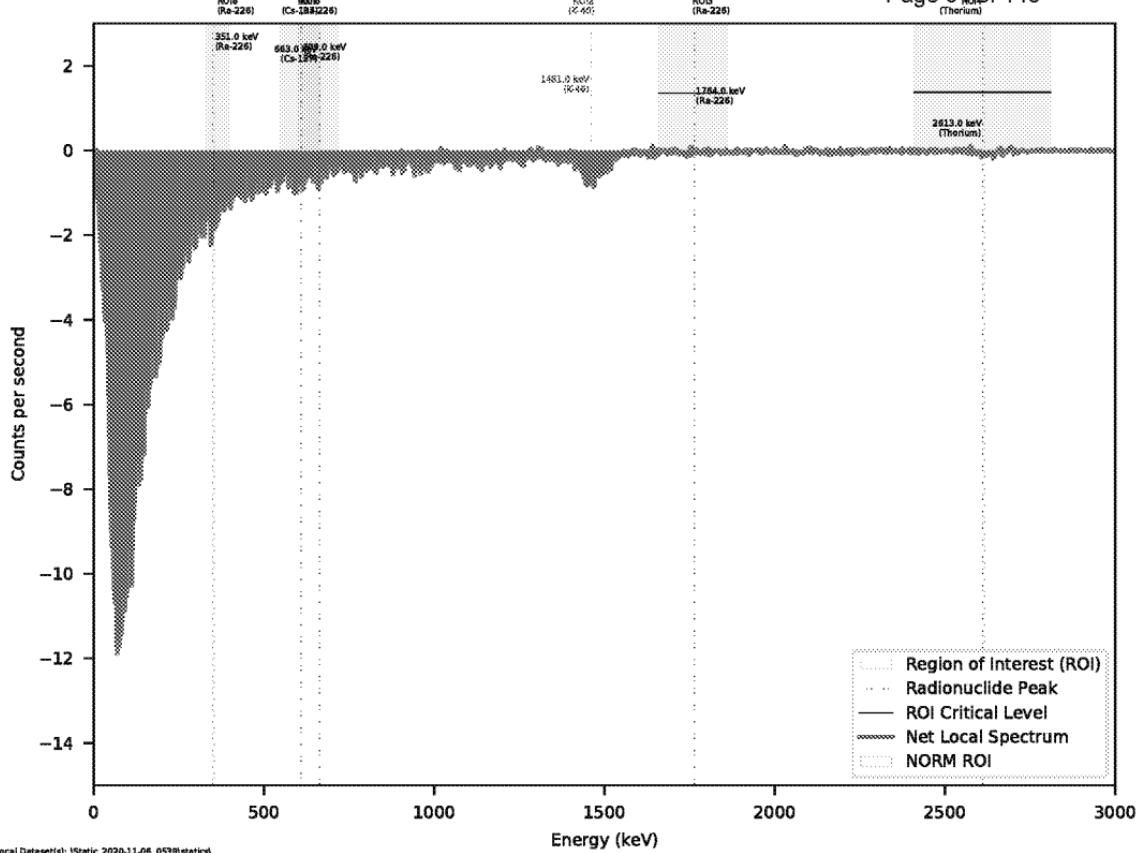
Net Gamma Spectrum, Static Location: 50

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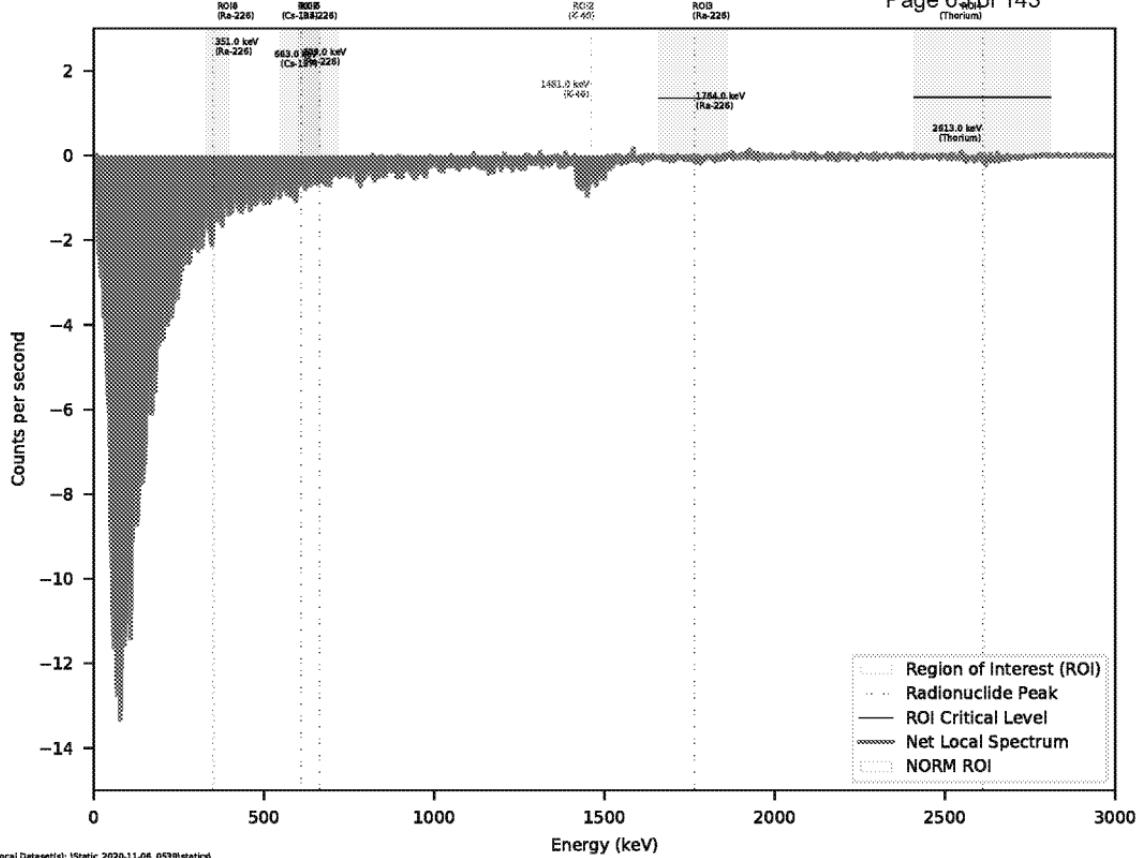
Net Gamma Spectrum, Static Location: 51

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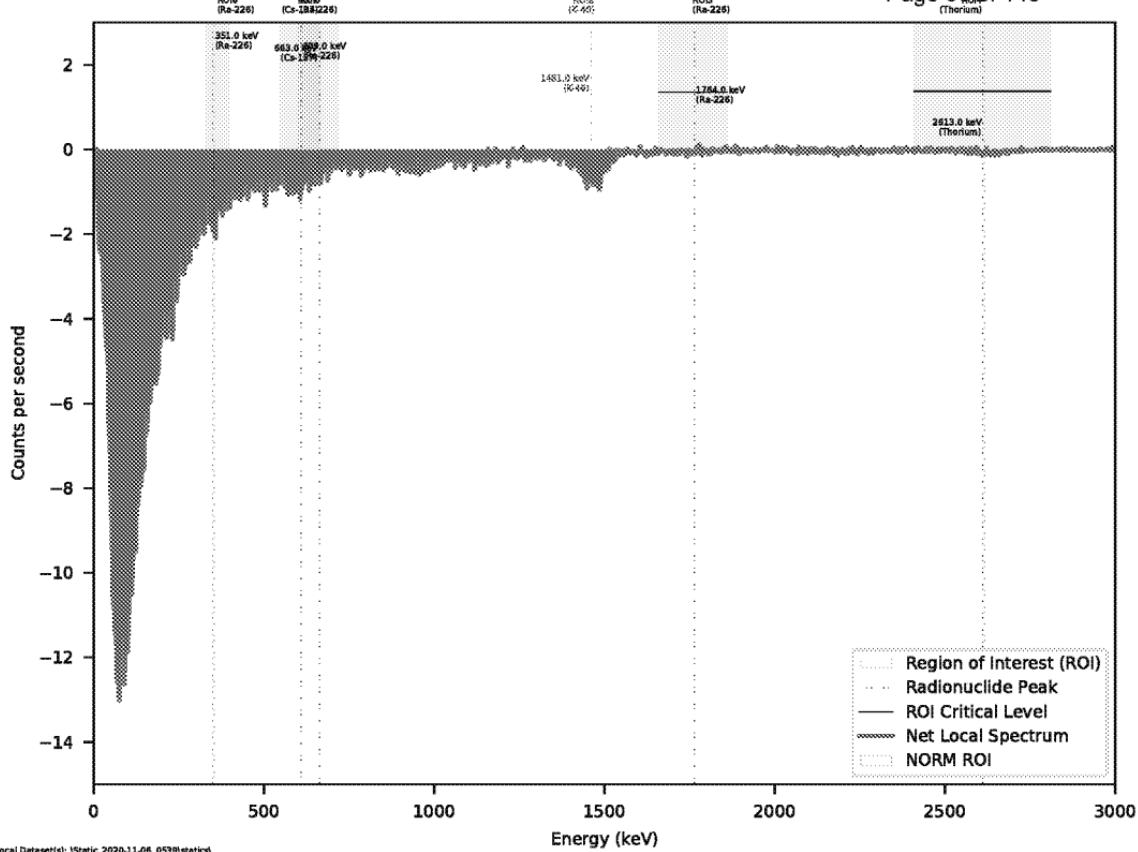
Net Gamma Spectrum, Static Location: 52

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Net Gamma Spectrum, Static Location: 53

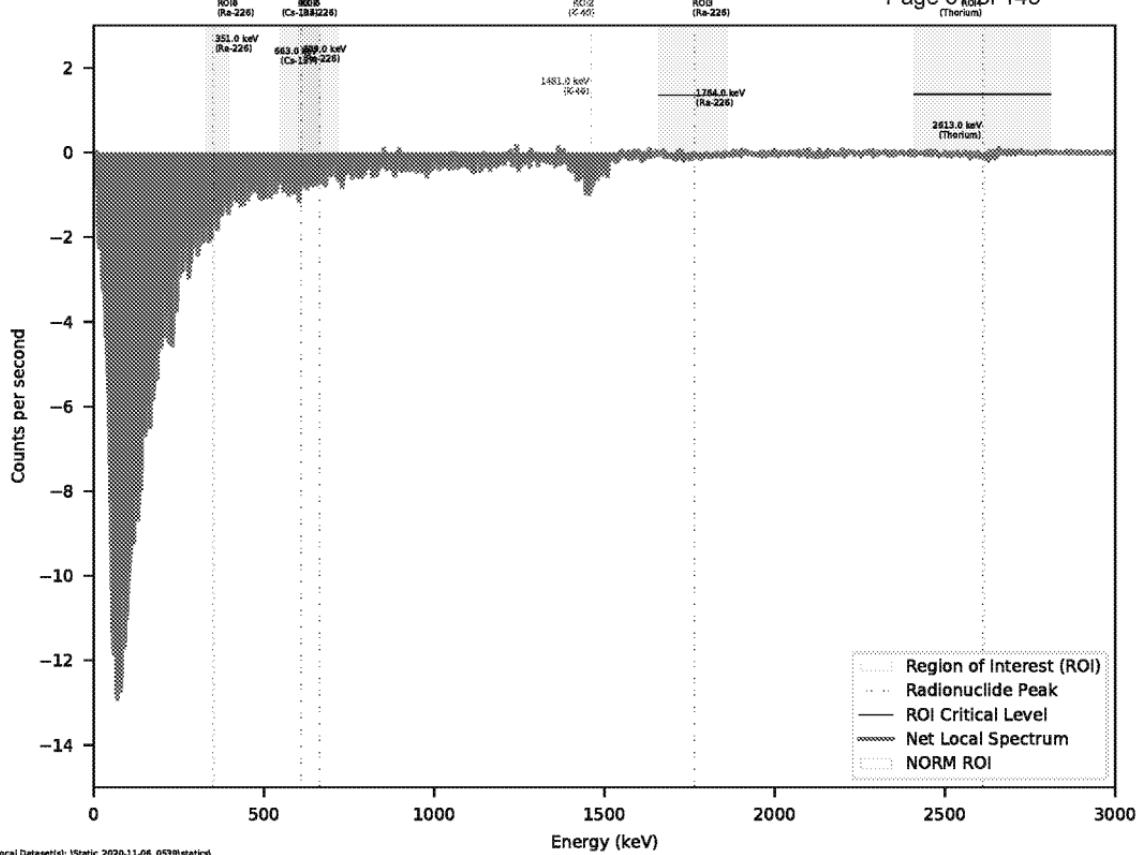
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ED_006360A_00000405-00066

Net Gamma Spectrum, Static Location: 54

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Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40336-1
Laboratory Sample Delivery Group: GJ46599772
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/8/2021 3:58:16 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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results through

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Expert

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Job ID: 160-40336-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40336-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Job ID: 160-40336-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.1 C.

STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21) and HPPG-F-028 (160-40336-27) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/12/2020 and 11/13/2020, prepared on 11/30/2020 and 12/09/2020 and analyzed on 12/09/2020 and 12/18/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11) HPPG-ESU-TU107A-021 (160-40336-21), HPPG-F-028 (160-40336-27).

The method blank (MB) Z-scores are within limits and is located in the level IV raw data. (MB 160-491323/23-A) and (MB 160-490555/21-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21) and HPPG-F-028 (160-40336-27) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 11/12/2020 and 11/13/2020, prepared on 12/01/2020 and analyzed on 12/15/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490636/1-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21), HPPG-F-028 (160-40336-27) and (160-40336-A-1-A DU).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21) and HPPG-F-028 (160-40336-27) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 11/12/2020 and 11/13/2020, prepared on 12/01/2020 and analyzed on 12/16/2020.

The U-232 tracer recovery (115%) is above the upper QC limit (110%). This excursion is isolated to the LCS and does not appear to have adversely affected the results, as the LCS spike recoveries are within limits.(LCS 160-490638/2-A)

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490638/1-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21), HPPG-F-028 (160-40336-27) and (160-40336-A-1-A DU).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-002 (160-40336-2), HPPG-ESU-TU107A-003 (160-40336-3), HPPG-ESU-TU107A-004 (160-40336-4), HPPG-ESU-TU107A-005 (160-40336-5), HPPG-ESU-TU107A-006 (160-40336-6), HPPG-ESU-TU107A-007 (160-40336-7), HPPG-ESU-TU107A-008 (160-40336-8), HPPG-ESU-TU107A-009 (160-40336-9), HPPG-ESU-TU107A-010 (160-40336-10), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-012 (160-40336-12), HPPG-ESU-TU107A-013 (160-40336-13), HPPG-ESU-TU107A-014 (160-40336-14), HPPG-ESU-TU107A-015 (160-40336-15),

Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Job ID: 160-40336-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

HPPG-ESU-TU107A-016 (160-40336-16), HPPG-ESU-TU107A-017 (160-40336-17), HPPG-ESU-TU107A-018 (160-40336-18), HPPG-ESU-TU107A-019 (160-40336-19), HPPG-ESU-TU107A-020 (160-40336-20), HPPG-ESU-TU107A-021 (160-40336-21), HPPG-ESU-TU107A-022 (160-40336-22), HPPG-ESU-TU107A-023 (160-40336-23), HPPG-ESU-TU107A-024 (160-40336-24), HPPG-ESU-TU107A-025 (160-40336-25), HPPG-F-027 (160-40336-26) and HPPG-F-028 (160-40336-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/12/2020 and 11/13/2020, prepared on 11/16/2020 and 11/20/2020 and analyzed on 12/07/2020, 12/08/2020 and 12/11/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 489271

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489271 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489271/1-A)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU (MB; Th-234 and 160-40336-12; U-235): HPPG-ESU-TU107A-012 (160-40336-12) and (MB 160-489271/1-A)

This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

Gamma prep batch 489279

The method blank (MB) z-score associated with Prep Batch 160-489279 is within limits and is stored in the level IV raw data. (MB 160-489279/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.
HPPG-ESU-TU107A-021 (160-40336-21) and HPPG-ESU-TU107A-022 (160-40336-22)

Gamma prep batch 489844

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489844 does not meet QC criteria. This appears to be random in

Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Job ID: 160-40336-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489844/1-A)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (MB 160-489844/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520Project Manager: Lisa Bercik
Phone #: (619)213-3389Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

CHAIN OF CUSTODY

Ref. Document # 501197RSY-025

Page 1 of 4

Project Number: 501197				Analysis Requested							
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action				Strontium-90 (EPA 905 MOI)							
Project Location: San Francisco, CA				Ra-226 by Alpha spec, Isotopic U (234, 235, 238)							
Purchase Order #: 1159058				Isotopic Ra (228, 229Ra)							
Shipment/Pickup Date: 11/10/2020											
Waybill Number: 14937 0225 5443											
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046											
Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566											
				# of Containers	Matrix	Preservatives (water)					
						Preservatives (soil)					
						Container Type					
Sample ID	Date	Time	Method				X	X	X	4	GJ46599772
HPPG-ESU-TU107A-001	11/6/2020	09:55	G	SO	1	16 oz. plastic jar	X	X	X	4	GJ46599772
HPPG-ESU-TU107A-002	11/6/2020	10:03	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
HPPG-ESU-TU107A-003	11/6/2020	10:12	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
HPPG-ESU-TU107A-004	11/6/2020	10:17	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
HPPG-ESU-TU107A-005	11/6/2020	10:19	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
HPPG-ESU-TU107A-006	11/6/2020	10:23	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
HPPG-ESU-TU107A-007	11/6/2020	10:25	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
HPPG-ESU-TU107A-008	11/6/2020	10:27	G	SO	1	16 oz. plastic jar	X			4	GJ46599772
Special Instructions:				21 day ingrowth results only Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g							
Turnaround Time: 3-day <input type="checkbox"/> 10-Day <input type="checkbox"/> 28-day <input type="checkbox"/> Other <input type="checkbox"/>				Level of QC Required: I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> Project Specific							
Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; SO = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening											

Relinquished By:

Relinquisher Signature:

Relinquish Date Time:

Received By:

Received Signature:

Receive Date Time:

Lewis, Devin		11/06/2020 16:21	Locked Storage (RKillpack)		11/06/2020 16:21
Locked Storage (RKillpack)		11/10/2020 13:04	Andrew Murni		11/10/2020 13:04
Andrew Murni		11/10/2020 13:20	SHIPPED TO LAB VIA FEDEX		11/11/2020 09:05

*** Last 3 transfers shown above - Complete list of transfers on last page ***



ED_006360A_00000405-00074



APTM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520Project Manager: Lisa Bercik
Phone #: (619)213-3389Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc
Andrew Murni

CHAIN OF CUSTODY

Ref. Document # 501197RSY-025

Page 2 of 4

Project Number: 501197				Analysis Requested										
				Hunters Point Naval Shipyard: Parcel		Project Name: G Remedial Action		Shipment/Pickup Date: 11/10/2020		Waybill Number: 695702255443		Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046		Comments
				Centres Spec (EPA 901.1 M)		Storage Spec (EPA 905 M0D)		Reg 226 by Alpha Spec, Isotope U-234		Isotope Pu (238, 239240)		Dose Rate R/Hr		Evidence Bag ID
				day in growth Gamma	235U	235U	238U	238U	234U	234U	234U	234U	234U	
Lab Contact Name/ph #														
				Rhonda Ridenbower (314)298-8566										
Collection Information				Matrix	# of Containers	Preservatives (water)		Preservatives (soil)		Container Type				
Sample ID	Date	Time	Method			16 oz. plastic jar	X			X	X	X		
HPPG-ESU-TU107A-009	11/6/2020	10:30	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-010	11/6/2020	10:31	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-011	11/6/2020	10:34	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-012	11/6/2020	10:37	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-013	11/6/2020	10:39	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-014	11/6/2020	10:42	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-015	11/6/2020	10:44	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-016	11/6/2020	10:47	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-017	11/6/2020	10:49	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-018	11/6/2020	10:51	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-019	11/6/2020	10:53	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-020	11/6/2020	10:55	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-021	11/6/2020	10:58	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-022	11/6/2020	11:01	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-023	11/6/2020	11:04	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-024	11/6/2020	11:08	G	SO	1								4	GJ46599772
HPPG-ESU-TU107A-025	11/6/2020	11:12	G	SO	1								4	GJ46599772





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520Project Manager: Lisa Bercik
Phone #: (619)213-3389Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc
Andrew Mum

CHAIN OF CUSTODY

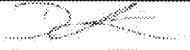
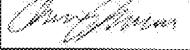
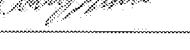
Ref. Document # 501197RSY-025

Page 3 of 4

Project Number: 501197		Analysis Requested																																																							
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action																																																									
Project Location: San Francisco, CA																																																									
Purchase Order #: 1159058																																																									
Shipment/Pickup Date: 11/10/2020																																																									
Waybill Number: 495902255993																																																									
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046																																																									
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566																																																									
<table border="1"> <thead> <tr> <th rowspan="3">Matrix</th> <th rowspan="3"># of Containers</th> <th colspan="2">Preservatives</th> <th colspan="2">Container Type</th> <th colspan="2">Storage Temp (F)</th> <th colspan="2">Dose Rate R/Hr</th> <th colspan="2">Evidence Bag ID</th> <th rowspan="3">Comment</th> </tr> <tr> <th colspan="2">(water)</th> <th colspan="2">(soil)</th> <th colspan="2">40-50</th> <th colspan="2">23-28</th> <th colspan="2">40-50</th> </tr> <tr> <th colspan="2">day in growth medium</th> <th colspan="2">23-28</th> <th colspan="2">40-50</th> <th colspan="2">23-28</th> <th colspan="2">40-50</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td></td> </tr> </tbody> </table>												Matrix	# of Containers	Preservatives		Container Type		Storage Temp (F)		Dose Rate R/Hr		Evidence Bag ID		Comment	(water)		(soil)		40-50		23-28		40-50		day in growth medium		23-28		40-50		23-28		40-50														
Matrix	# of Containers	Preservatives		Container Type		Storage Temp (F)		Dose Rate R/Hr		Evidence Bag ID				Comment																																											
		(water)		(soil)		40-50		23-28		40-50																																															
		day in growth medium		23-28		40-50		23-28		40-50																																															
Collection Information		Date	Time	Method	Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Storage Temp (F)	Dose Rate R/Hr	Evidence Bag ID	Comment																																												
Sample ID	HPPG-F-027	11/6/2020	10:30	G	SO	1	16 oz. plastic jar	X	X	40-50	4	GJ46599772																																													
	HPPG-F-028	11/6/2020	10:58	G	SO	1	16 oz. plastic jar	X	X	23-28	4	GJ46599772																																													

All Transfers for COC 501197RSY-025

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Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/06/2020 16:21	Locked Storage (RKilipack)		11/06/2020 16:21
Locked Storage (RKilipack)		11/10/2020 13:04	Andrew Murri		11/10/2020 13:04
Andrew Murri		11/10/2020 13:20	SHIPPED TO LAB via FedEx		11/11/2020 09:05

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40336-1
SDG Number: GJ46599772**Login Number:** 40336**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Korrinhizer, Micha L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Qualifiers

Rad Qualifier	Qualifier Description
Q	Tracer is outside acceptance limits.
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

Sample Summary

Page 81 of 143

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40336-1	HPPG-ESU-TU107A-001	Solid	11/06/20 09:55	11/11/20 09:05	
160-40336-2	HPPG-ESU-TU107A-002	Solid	11/06/20 10:03	11/11/20 09:05	
160-40336-3	HPPG-ESU-TU107A-003	Solid	11/06/20 10:12	11/11/20 09:05	
160-40336-4	HPPG-ESU-TU107A-004	Solid	11/06/20 10:17	11/11/20 09:05	
160-40336-5	HPPG-ESU-TU107A-005	Solid	11/06/20 10:19	11/11/20 09:05	
160-40336-6	HPPG-ESU-TU107A-006	Solid	11/06/20 10:23	11/11/20 09:05	
160-40336-7	HPPG-ESU-TU107A-007	Solid	11/06/20 10:25	11/11/20 09:05	
160-40336-8	HPPG-ESU-TU107A-008	Solid	11/06/20 10:27	11/11/20 09:05	
160-40336-9	HPPG-ESU-TU107A-009	Solid	11/06/20 10:30	11/11/20 09:05	
160-40336-10	HPPG-ESU-TU107A-010	Solid	11/06/20 10:31	11/11/20 09:05	
160-40336-11	HPPG-ESU-TU107A-011	Solid	11/06/20 10:34	11/11/20 09:05	
160-40336-12	HPPG-ESU-TU107A-012	Solid	11/06/20 10:37	11/11/20 09:05	
160-40336-13	HPPG-ESU-TU107A-013	Solid	11/06/20 10:39	11/11/20 09:05	
160-40336-14	HPPG-ESU-TU107A-014	Solid	11/06/20 10:42	11/11/20 09:05	
160-40336-15	HPPG-ESU-TU107A-015	Solid	11/06/20 10:44	11/11/20 09:05	
160-40336-16	HPPG-ESU-TU107A-016	Solid	11/06/20 10:47	11/11/20 09:05	
160-40336-17	HPPG-ESU-TU107A-017	Solid	11/06/20 10:49	11/11/20 09:05	
160-40336-18	HPPG-ESU-TU107A-018	Solid	11/06/20 10:51	11/11/20 09:05	
160-40336-19	HPPG-ESU-TU107A-019	Solid	11/06/20 10:53	11/11/20 09:05	
160-40336-20	HPPG-ESU-TU107A-020	Solid	11/06/20 10:55	11/11/20 09:05	
160-40336-21	HPPG-ESU-TU107A-021	Solid	11/06/20 10:58	11/11/20 09:05	
160-40336-22	HPPG-ESU-TU107A-022	Solid	11/06/20 11:01	11/11/20 09:05	
160-40336-23	HPPG-ESU-TU107A-023	Solid	11/06/20 11:04	11/11/20 09:05	
160-40336-24	HPPG-ESU-TU107A-024	Solid	11/06/20 11:08	11/11/20 09:05	
160-40336-25	HPPG-ESU-TU107A-025	Solid	11/06/20 11:12	11/11/20 09:05	
160-40336-26	HPPG-F-027	Solid	11/06/20 10:30	11/11/20 09:05	
160-40336-27	HPPG-F-028	Solid	11/06/20 10:58	11/11/20 09:05	

Eurofins TestAmerica, St. Louis

Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-001

Lab Sample ID: 160-40336-1

Matrix: Solid

Date Collected: 11/06/20 09:55
Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.0187	U	0.129	0.129	0.331	0.107	pCi/g	11/30/20 10:34	12/09/20 17:57	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	101		40 - 110					11/30/20 10:34	12/09/20 17:57	1
Y Carrier	95.7		40 - 110					11/30/20 10:34	12/09/20 17:57	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	-0.0117	U	0.0110	0.0111	0.100	0.0120	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Plutonium-239/240	-0.00195	U	0.0103	0.0103	0.100	0.00909	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	89.7		30 - 110					12/01/20 15:59	12/15/20 17:58	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.283		0.0829	0.0863	0.250	0.0273	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-235/236	0.0449		0.0425	0.0427	0.100	0.0212	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-238	0.276		0.0813	0.0845	0.250	0.0257	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	100		30 - 110					12/01/20 16:11	12/16/20 18:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.373		0.118	0.124		0.102	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Actinium-227	0.109	U	0.362	0.363		0.243	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Bismuth-212	-0.0121	U	0.506	0.506		0.418	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Bismuth-214	0.281		0.0879	0.0927		0.0371	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Cesium-137	-0.00897	U	0.0583	0.0583	0.0700	0.0474	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Lead-210	0.557	U	1.23	1.23		0.989	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Lead-212	0.303		0.0648	0.0757		0.0319	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Lead-214	0.336		0.0872	0.0940		0.0438	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Potassium-40	8.86		1.14	1.46		0.228	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Protactinium-231	0.000	U	0.248	0.248		1.61	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Protactinium-234	0.0780	U	0.0782	0.0786		0.189	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Radium-226	0.281		0.0879	0.0927	0.200	0.0371	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Radium-228	0.373		0.118	0.124		0.102	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Thallium-208	0.139		0.0367	0.0394		0.00967	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Thorium 228	0.303		0.0648	0.0757		0.0319	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Thorium-232	0.373		0.118	0.124		0.102	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Thorium-234	-0.0133	U	0.0259	0.0260		0.805	pCi/g	11/16/20 17:31	12/07/20 22:39	1
Uranium-235	0.000	U	0.159	0.159		0.345	pCi/g	11/16/20 17:31	12/07/20 22:39	1

Eurofins TestAmerica, St. Louis

Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-001

Lab Sample ID: 160-40336-1

Date Collected: 11/06/20 09:55

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-238	-0.0133	U	0.0259	0.0260		0.805	pCi/g	11/16/20 17:31	12/07/20 22:39	1

Client Sample ID: HPPG-ESU-TU107A-002

Lab Sample ID: 160-40336-2

Date Collected: 11/06/20 10:03

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.561		0.182	0.191		0.0345	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Actinium-227	-0.0278	U	0.147	0.147		0.334	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Bismuth-212	-0.285	U	1.19	1.19		0.959	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Bismuth-214	0.405		0.117	0.124		0.0435	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Cesium-137	0.00504	U	0.0722	0.0722	0.0700	0.0591	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Lead-210	-0.264	U	1.45	1.45		1.20	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Lead-212	0.277		0.0889	0.0958		0.0531	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Lead-214	0.416		0.104	0.113		0.0526	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Potassium-40	8.29		1.44	1.67		0.256	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Protactinium-231	0.000	U	0.292	0.292		2.21	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Protactinium-234	0.142	U	0.229	0.230		0.221	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Radium-226	0.405		0.117	0.124	0.200	0.0435	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Radium-228	0.561		0.182	0.191		0.0345	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Thallium-208	0.144		0.0489	0.0512		0.0160	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Thorium 228	0.277		0.0889	0.0958		0.0531	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Thorium-232	0.561		0.182	0.191		0.0345	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Thorium-234	-0.439	U	0.804	0.805		1.03	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Uranium-235	-0.148	U	0.257	0.257		0.392	pCi/g	11/16/20 17:31	12/07/20 22:41	1
Uranium-238	-0.439	U	0.804	0.805		1.03	pCi/g	11/16/20 17:31	12/07/20 22:41	1

Client Sample ID: HPPG-ESU-TU107A-003

Lab Sample ID: 160-40336-3

Date Collected: 11/06/20 10:12

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.542		0.184	0.194		0.108	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Actinium-227	0.466		0.472	0.475		0.309	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Bismuth-212	0.249	U	0.463	0.464		0.337	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Bismuth-214	0.420		0.177	0.183		0.0743	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Cesium-137	0.0162	U	0.0851	0.0851	0.0700	0.0688	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Lead-210	-1.81	U	1.63	1.65		1.82	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Lead-212	0.0255	U	0.134	0.134		0.109	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Lead-214	0.367		0.136	0.143		0.0666	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Potassium-40	7.05		1.32	1.55		0.302	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Protactinium-231	0.548	U	1.70	1.70		1.87	pCi/g	11/16/20 17:31	12/07/20 22:42	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-003
Date Collected: 11/06/20 10:12
Date Received: 11/11/20 09:05

Lab Sample ID: 160-40336-3
Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0382	U	0.0620	0.0622		0.297	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Radium-226	0.420		0.177	0.183	0.200	0.0743	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Radium-228	0.542		0.184	0.194		0.108	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Thallium-208	0.139		0.0504	0.0529		0.0169	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Thorium 228	0.0255	U	0.134	0.134		0.109	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Thorium-232	0.542		0.184	0.194		0.108	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Thorium-234	-0.889	U	0.751	0.759		0.899	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Uranium-235	-0.0668	U	0.0948	0.0951		0.595	pCi/g	11/16/20 17:31	12/07/20 22:42	1
Uranium-238	-0.889	U	0.751	0.759		0.899	pCi/g	11/16/20 17:31	12/07/20 22:42	1

Client Sample ID: HPPG-ESU-TU107A-004

Lab Sample ID: 160-40336-4

Date Collected: 11/06/20 10:17

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.390		0.195	0.199		0.123	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Actinium-227	-0.282	U	0.590	0.591		0.356	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Bismuth-212	0.0449	U	0.954	0.954		0.782	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Bismuth-214	0.355		0.114	0.120		0.0434	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Cesium-137	-0.0249	U	0.0675	0.0676	0.0700	0.0533	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Lead-210	0.759	U	1.13	1.14		0.772	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Lead-212	0.306		0.0796	0.0857		0.0435	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Lead-214	0.439		0.115	0.123		0.0457	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Potassium-40	7.92		1.38	1.60		0.200	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Protactinium-231	0.313	U	1.30	1.30		2.02	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Protactinium-234	0.0738	U	0.168	0.168		0.199	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Radium-226	0.355		0.114	0.120	0.200	0.0434	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Radium-228	0.390		0.195	0.199		0.123	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Thallium-208	0.189		0.0500	0.0535		0.00771	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Thorium 228	0.306		0.0796	0.0857		0.0435	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Thorium-232	0.390		0.195	0.199		0.123	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Thorium-234	0.406		0.413	0.416		0.372	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Uranium-235	0.0129	U	0.232	0.232		0.407	pCi/g	11/16/20 17:31	12/07/20 22:44	1
Uranium-238	0.406		0.413	0.416		0.372	pCi/g	11/16/20 17:31	12/07/20 22:44	1

Client Sample ID: HPPG-ESU-TU107A-005

Lab Sample ID: 160-40336-5

Date Collected: 11/06/20 10:19

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.468		0.221	0.226		0.0777	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Actinium-227	0.171	U	0.365	0.366		0.262	pCi/g	11/16/20 17:31	12/07/20 22:46	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-005

Lab Sample ID: 160-40336-5

Date Collected: 11/06/20 10:19

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.00384	U	0.762	0.762		0.627	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Bismuth-214	0.352		0.126	0.131		0.0632	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Cesium-137	0.0106	U	0.0611	0.0611	0.0700	0.0490	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Lead-210	-0.0893	U	1.09	1.09		0.782	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Lead-212	0.303		0.0777	0.0870		0.0359	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Lead-214	0.306		0.112	0.116		0.0752	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Potassium-40	6.75		1.33	1.50		0.245	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Protactinium-231	0.538	U	1.66	1.66		1.82	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Protactinium-234	0.0299	U	0.120	0.120		0.148	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Radium-226	0.352		0.126	0.131	0.200	0.0632	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Radium-228	0.468		0.221	0.226		0.0777	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Thallium-208	0.0482		0.0712	0.0714		0.0470	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Thorium 228	0.303		0.0777	0.0870		0.0359	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Thorium-232	0.468		0.221	0.226		0.0777	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Thorium-234	0.807		0.573	0.580		0.339	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Uranium-235	-0.156	U	0.307	0.307		0.311	pCi/g	11/16/20 17:31	12/07/20 22:46	1
Uranium-238	0.807		0.573	0.580		0.339	pCi/g	11/16/20 17:31	12/07/20 22:46	1

Client Sample ID: HPPG-ESU-TU107A-006

Lab Sample ID: 160-40336-6

Date Collected: 11/06/20 10:23

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.616		0.243	0.253		0.0783	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Actinium-227	-0.439	U	0.658	0.660		0.493	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Bismuth-212	-0.318	U	0.871	0.872		0.688	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Bismuth-214	0.143		0.104	0.105		0.131	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Cesium-137	-0.0341	U	0.0710	0.0711	0.0700	0.0552	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Lead-210	0.964		1.42	1.43		0.960	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Lead-212	0.367		0.100	0.109		0.0568	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Lead-214	0.426		0.132	0.141		0.0688	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Potassium-40	8.27		1.44	1.73		0.309	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Protactinium-231	0.000	U	0.712	0.712		2.57	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Protactinium-234	-0.0274	U	0.0559	0.0560		0.309	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Radium-226	0.143		0.104	0.105	0.200	0.131	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Radium-228	0.616		0.243	0.253		0.0783	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Thallium-208	0.180		0.0708	0.0738		0.0262	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Thorium 228	0.367		0.100	0.109		0.0568	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Thorium-232	0.616		0.243	0.253		0.0783	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Thorium-234	0.890		0.836	0.843		0.507	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Uranium-235	-0.244	U	0.445	0.446		0.543	pCi/g	11/16/20 17:31	12/08/20 11:55	1
Uranium-238	0.890		0.836	0.843		0.507	pCi/g	11/16/20 17:31	12/08/20 11:55	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-007

Lab Sample ID: 160-40336-7

Matrix: Solid

Date Collected: 11/06/20 10:25
Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.361		0.144	0.148		0.0438	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Actinium-227	-0.253	U	0.709	0.710		0.280	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Bismuth-212	0.128	U	0.450	0.451		0.357	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Bismuth-214	0.301		0.0874	0.0928		0.0360	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Cesium-137	-0.00685	U	0.0454	0.0454	0.0700	0.0368	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Lead-210	0.460	U	0.886	0.888		0.702	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Lead-212	0.337		0.0657	0.0789		0.0306	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Lead-214	0.364		0.0847	0.0927		0.0312	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Potassium-40	7.48		1.04	1.29		0.223	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Protactinium-231	0.495	U	1.36	1.36		1.49	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Protactinium-234	0.183		0.0860	0.0881		0.148	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Radium-226	0.301		0.0874	0.0928	0.200	0.0360	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Radium-228	0.361		0.144	0.148		0.0438	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Thallium-208	0.139		0.0362	0.0390		0.00948	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Thorium 228	0.337		0.0657	0.0789		0.0306	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Thorium-232	0.361		0.144	0.148		0.0438	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Thorium-234	-0.266	U	0.882	0.882		0.720	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Uranium-235	-0.000289	U	0.000543	0.000544		0.275	pCi/g	11/16/20 17:31	12/08/20 12:26	1
Uranium-238	-0.266	U	0.882	0.882		0.720	pCi/g	11/16/20 17:31	12/08/20 12:26	1

Client Sample ID: HPPG-ESU-TU107A-008

Lab Sample ID: 160-40336-8

Matrix: Solid

Date Collected: 11/06/20 10:27
Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.412		0.197	0.201		0.0737	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Actinium-227	0.108	U	0.411	0.411		0.296	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Bismuth-212	-0.293	U	0.756	0.756		0.596	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Bismuth-214	0.302		0.119	0.123		0.0542	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Cesium-137	0.0240	U	0.0516	0.0517	0.0700	0.0399	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Lead-210	-0.511	U	1.54	1.54		1.28	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Lead-212	0.216		0.116	0.119		0.0557	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Lead-214	0.492		0.114	0.125		0.0318	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Potassium-40	6.86		1.24	1.42		0.227	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Protactinium-231	-0.837	U	2.15	2.15		1.73	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Protactinium-234	0.126	U	0.202	0.203		0.191	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Radium-226	0.302		0.119	0.123	0.200	0.0542	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Radium-228	0.412		0.197	0.201		0.0737	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Thallium-208	0.0983		0.0479	0.0490		0.0208	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Thorium 228	0.216		0.116	0.119		0.0557	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Thorium-232	0.412		0.197	0.201		0.0737	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Thorium-234	0.512		0.487	0.491		0.349	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Uranium-235	-0.00688	U	0.274	0.274		0.353	pCi/g	11/16/20 17:31	12/07/20 23:18	1
Uranium-238	0.512		0.487	0.491		0.349	pCi/g	11/16/20 17:31	12/07/20 23:18	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-009

Lab Sample ID: 160-40336-9

Date Collected: 11/06/20 10:30

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.0913	U	0.170	0.170		0.107	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Actinium-227	-0.390	U	0.658	0.660		0.444	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Bismuth-212	0.349	U	0.698	0.699		0.534	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Bismuth-214	0.451		0.122	0.133		0.0408	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Cesium-137	0.0355	U	0.0804	0.0805	0.0700	0.0633	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Lead-210	1.35		1.59	1.60		1.03	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Lead-212	0.310		0.100	0.107		0.0623	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Lead-214	0.348		0.106	0.113		0.0664	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Potassium-40	8.06		1.40	1.68		0.299	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Protactinium-231	0.000	U	0.666	0.666		2.39	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Protactinium-234	-0.112	U	0.341	0.342		0.278	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Radium-226	0.451		0.122	0.133	0.200	0.0408	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Radium-228	0.0913	U	0.170	0.170		0.107	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Thallium-208	0.143		0.0502	0.0528		0.0168	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Thorium 228	0.310		0.100	0.107		0.0623	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Thorium-232	0.0913	U	0.170	0.170		0.107	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Thorium-234	-0.539	U	0.794	0.796		0.916	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Uranium-235	0.201	U	0.383	0.383		0.375	pCi/g	11/16/20 17:31	12/07/20 23:19	1
Uranium-238	-0.539	U	0.794	0.796		0.916	pCi/g	11/16/20 17:31	12/07/20 23:19	1

Client Sample ID: HPPG-ESU-TU107A-010

Lab Sample ID: 160-40336-10

Date Collected: 11/06/20 10:31

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.604		0.181	0.191		0.0333	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Actinium-227	0.0657	U	0.206	0.206		0.280	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Bismuth-212	0.318	U	0.748	0.748		0.583	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Bismuth-214	0.353		0.119	0.124		0.0470	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Cesium-137	-0.0234	U	0.0673	0.0673	0.0700	0.0533	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Lead-210	-0.402	U	1.38	1.38		1.15	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Lead-212	0.285		0.0764	0.0820		0.0414	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Lead-214	0.358		0.0994	0.106		0.0326	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Potassium-40	7.51		1.35	1.55		0.202	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Protactinium-231	0.000	U	0.303	0.303		1.99	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Protactinium-234	0.115	U	0.208	0.208		0.177	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Radium-226	0.353		0.119	0.124	0.200	0.0470	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Radium-228	0.604		0.181	0.191		0.0333	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Thallium-208	0.163		0.0515	0.0541		0.0131	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Thorium 228	0.285		0.0764	0.0820		0.0414	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Thorium-232	0.604		0.181	0.191		0.0333	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Thorium-234	-0.249	U	0.765	0.766		0.637	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Uranium-235	-0.168	U	0.327	0.328		0.341	pCi/g	11/16/20 17:31	12/07/20 23:21	1
Uranium-238	-0.249	U	0.765	0.766		0.637	pCi/g	11/16/20 17:31	12/07/20 23:21	1

Eurofins TestAmerica, St. Louis

Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-011

Lab Sample ID: 160-40336-11

Matrix: Solid

Date Collected: 11/06/20 10:34
Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.0643	U	0.136	0.136	0.331	0.107	pCi/g	11/30/20 10:34	12/09/20 17:58	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					11/30/20 10:34	12/09/20 17:58	1
Y Carrier	94.6		40 - 110					11/30/20 10:34	12/09/20 17:58	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	-0.0262	U	0.0166	0.0167	0.100	0.0181	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Plutonium-239/240	-0.00604	U	0.0107	0.0107	0.100	0.0105	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	90.9		30 - 110					12/01/20 15:59	12/15/20 17:58	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.294		0.0806	0.0843	0.250	0.0242	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-235/236	0.0333		0.0296	0.0298	0.100	0.00753	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-238	0.282		0.0760	0.0796	0.250	0.0160	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	96.5		30 - 110					12/01/20 16:11	12/16/20 18:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.160	U	0.134	0.135		0.182	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Actinium-227	0.131	U	0.562	0.563		0.343	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Bismuth-212	-0.498	U	0.681	0.683		0.757	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Bismuth-214	0.196		0.125	0.127		0.0754	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Cesium-137	-0.0176	U	0.114	0.114	0.0700	0.0323	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Lead-210	0.487	U	0.900	0.902		0.621	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Lead-212	0.313		0.0867	0.0957		0.0456	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Lead-214	0.380		0.129	0.135		0.0663	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Potassium-40	7.64		1.45	1.64		0.256	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Protactinium-231	0.285	U	1.13	1.13		1.91	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Protactinium-234	0.0344	U	0.0814	0.0815		0.153	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Radium-226	0.196		0.125	0.127	0.200	0.0754	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Radium-228	0.160	U	0.134	0.135		0.182	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Thallium-208	0.134		0.0609	0.0625		0.0233	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Thorium 228	0.313		0.0867	0.0957		0.0456	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Thorium-232	0.160	U	0.134	0.135		0.182	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Thorium-234	0.783		0.564	0.570		0.340	pCi/g	11/16/20 17:31	12/07/20 23:20	1
Uranium-235	0.0911	U	0.264	0.265		0.206	pCi/g	11/16/20 17:31	12/07/20 23:20	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-011

Lab Sample ID: 160-40336-11

Date Collected: 11/06/20 10:34

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-238	0.783		0.564	0.570		0.340	pCi/g	11/16/20 17:31	12/07/20 23:20	1

Client Sample ID: HPPG-ESU-TU107A-012

Lab Sample ID: 160-40336-12

Date Collected: 11/06/20 10:37

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.508		0.211	0.219		0.108	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Actinium-227	-0.365	U	0.626	0.628		0.409	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Bismuth-212	0.0712	U	1.23	1.23		1.01	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Bismuth-214	0.461		0.149	0.158		0.0601	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Cesium-137	0.0280	U	0.0548	0.0549	0.0700	0.0417	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Lead-210	0.451	U	1.83	1.83		1.15	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Lead-212	0.463		0.0956	0.110		0.0421	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Lead-214	0.444		0.172	0.179		0.0758	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Potassium-40	8.44		1.44	1.73		0.301	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Protactinium-231	0.610	U	2.04	2.04		2.24	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Protactinium-234	0.0425	U	0.0735	0.0737		0.289	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Radium-226	0.461		0.149	0.158	0.200	0.0601	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Radium-228	0.508		0.211	0.219		0.108	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Thallium-208	0.121		0.0771	0.0784		0.0387	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Thorium 228	0.463		0.0956	0.110		0.0421	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Thorium-232	0.508		0.211	0.219		0.108	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Thorium-234	0.618		0.625	0.630		0.470	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Uranium-235	-0.246	U	0.146	0.148		0.539	pCi/g	11/16/20 17:31	12/08/20 05:57	1
Uranium-238	0.618		0.625	0.630		0.470	pCi/g	11/16/20 17:31	12/08/20 05:57	1

Client Sample ID: HPPG-ESU-TU107A-013

Lab Sample ID: 160-40336-13

Date Collected: 11/06/20 10:39

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.477		0.166	0.173		0.0323	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Actinium-227	0.162	U	0.562	0.562		0.327	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Bismuth-212	-0.546	U	0.939	0.940		0.731	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Bismuth-214	-0.0867	U	0.120	0.120		0.171	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Cesium-137	0.0337	U	0.0639	0.0640	0.0700	0.0495	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Lead-210	-1.59	U	1.19	1.21		1.28	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Lead-212	0.306		0.0893	0.0977		0.0528	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Lead-214	0.319		0.102	0.107		0.0536	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Potassium-40	7.49		1.33	1.53		0.240	pCi/g	11/16/20 17:31	12/08/20 12:24	1
Protactinium-231	0.261	U	1.34	1.34		2.07	pCi/g	11/16/20 17:31	12/08/20 12:24	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-013

Lab Sample ID: 160-40336-13

Date Collected: 11/06/20 10:39

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Protactinium-234	0.0640	U		0.0888	0.0890		0.223	pCi/g	11/16/20 17:31	12/08/20 12:24
Radium-226	-0.0867	U		0.120	0.120	0.200	0.171	pCi/g	11/16/20 17:31	12/08/20 12:24
Radium-228	0.477			0.166	0.173		0.0323	pCi/g	11/16/20 17:31	12/08/20 12:24
Thallium-208	0.0845			0.0565	0.0572		0.0273	pCi/g	11/16/20 17:31	12/08/20 12:24
Thorium 228	0.306			0.0893	0.0977		0.0528	pCi/g	11/16/20 17:31	12/08/20 12:24
Thorium-232	0.477			0.166	0.173		0.0323	pCi/g	11/16/20 17:31	12/08/20 12:24
Thorium-234	0.656			0.548	0.553		0.379	pCi/g	11/16/20 17:31	12/08/20 12:24
Uranium-235	0.0262	U		0.465	0.465		0.382	pCi/g	11/16/20 17:31	12/08/20 12:24
Uranium-238	0.656			0.548	0.553		0.379	pCi/g	11/16/20 17:31	12/08/20 12:24

Client Sample ID: HPPG-ESU-TU107A-014

Lab Sample ID: 160-40336-14

Date Collected: 11/06/20 10:42

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.439			0.160	0.166		0.0341	pCi/g	11/16/20 17:31	12/08/20 06:07
Actinium-227	-0.343	U		0.673	0.674		0.406	pCi/g	11/16/20 17:31	12/08/20 06:07
Bismuth-212	0.000	U		0.321	0.321		0.617	pCi/g	11/16/20 17:31	12/08/20 06:07
Bismuth-214	0.440			0.126	0.134		0.0473	pCi/g	11/16/20 17:31	12/08/20 06:07
Cesium-137	-0.0315	U		0.0734	0.0734	0.0700	0.0577	pCi/g	11/16/20 17:31	12/08/20 06:07
Lead-210	0.984			1.43	1.43		0.910	pCi/g	11/16/20 17:31	12/08/20 06:07
Lead-212	0.0197	U		0.104	0.104		0.0842	pCi/g	11/16/20 17:31	12/08/20 06:07
Lead-214	0.248			0.0904	0.0939		0.0842	pCi/g	11/16/20 17:31	12/08/20 06:07
Potassium-40	7.58			1.37	1.57		0.207	pCi/g	11/16/20 17:31	12/08/20 06:07
Protactinium-231	-0.740	U		2.31	2.31		1.87	pCi/g	11/16/20 17:31	12/08/20 06:07
Protactinium-234	-0.0285	U		0.0882	0.0883		0.228	pCi/g	11/16/20 17:31	12/08/20 06:07
Radium-226	0.440			0.126	0.134	0.200	0.0473	pCi/g	11/16/20 17:31	12/08/20 06:07
Radium-228	0.439			0.160	0.166		0.0341	pCi/g	11/16/20 17:31	12/08/20 06:07
Thallium-208	0.0947			0.0908	0.0913		0.0406	pCi/g	11/16/20 17:31	12/08/20 06:07
Thorium 228	0.0197	U		0.104	0.104		0.0842	pCi/g	11/16/20 17:31	12/08/20 06:07
Thorium-232	0.439			0.160	0.166		0.0341	pCi/g	11/16/20 17:31	12/08/20 06:07
Thorium-234	-0.299	U		0.807	0.808		0.673	pCi/g	11/16/20 17:31	12/08/20 06:07
Uranium-235	0.0148	U		0.0464	0.0464		0.438	pCi/g	11/16/20 17:31	12/08/20 06:07
Uranium-238	-0.299	U		0.807	0.808		0.673	pCi/g	11/16/20 17:31	12/08/20 06:07

Client Sample ID: HPPG-ESU-TU107A-015

Lab Sample ID: 160-40336-15

Date Collected: 11/06/20 10:44

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.424			0.161	0.167		0.0624	pCi/g	11/16/20 17:31	12/08/20 06:08
Actinium-227	-0.208	U		0.546	0.547		0.329	pCi/g	11/16/20 17:31	12/08/20 06:08

Eurofins TestAmerica, St. Louis

Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-015

Lab Sample ID: 160-40336-15

Date Collected: 11/06/20 10:44

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.00385	U	0.626	0.626		0.618	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Bismuth-214	0.293		0.132	0.135		0.0717	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Cesium-137	0.00221	U	0.0474	0.0474	0.0700	0.0385	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Lead-210	0.990		0.986	0.993		0.599	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Lead-212	0.322		0.0847	0.0944		0.0434	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Lead-214	0.212		0.107	0.110		0.0623	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Potassium-40	7.08		1.37	1.55		0.246	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Protactinium-231	-0.179	U	2.34	2.34		1.92	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Protactinium-234	0.118	U	0.200	0.200		0.136	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Radium-226	0.293		0.132	0.135	0.200	0.0717	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Radium-228	0.424		0.161	0.167		0.0624	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Thallium-208	0.0961		0.0536	0.0545		0.0256	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Thorium 228	0.322		0.0847	0.0944		0.0434	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Thorium-232	0.424		0.161	0.167		0.0624	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Thorium-234	-0.460	U	0.517	0.519		0.653	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Uranium-235	0.0586	U	0.159	0.159		0.243	pCi/g	11/16/20 17:31	12/08/20 06:08	1
Uranium-238	-0.460	U	0.517	0.519		0.653	pCi/g	11/16/20 17:31	12/08/20 06:08	1

Client Sample ID: HPPG-ESU-TU107A-016

Lab Sample ID: 160-40336-16

Date Collected: 11/06/20 10:47

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.473		0.162	0.171		0.0324	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Actinium-227	0.200	U	0.535	0.536		0.324	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Bismuth-212	0.236	U	0.414	0.415		0.295	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Bismuth-214	0.489		0.161	0.170		0.0688	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Cesium-137	0.0238	U	0.0587	0.0588	0.0700	0.0458	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Lead-210	0.861	U	1.64	1.64		1.05	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Lead-212	0.438		0.0928	0.106		0.0430	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Lead-214	0.521		0.124	0.137		0.0493	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Potassium-40	8.98		1.55	1.86		0.396	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Protactinium-231	0.687	U	2.06	2.06		2.25	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Protactinium-234	-0.000715	U	0.00134	0.00134		0.307	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Radium-226	0.489		0.161	0.170	0.200	0.0688	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Radium-228	0.473		0.162	0.171		0.0324	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Thallium-208	0.162		0.0704	0.0728		0.0285	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Thorium 228	0.438		0.0928	0.106		0.0430	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Thorium-232	0.473		0.162	0.171		0.0324	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Thorium-234	0.523		0.528	0.532		0.446	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Uranium-235	0.246	U	0.400	0.401		0.505	pCi/g	11/16/20 17:31	12/08/20 06:32	1
Uranium-238	0.523		0.528	0.532		0.446	pCi/g	11/16/20 17:31	12/08/20 06:32	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-017

Lab Sample ID: 160-40336-17

Matrix: Solid

Date Collected: 11/06/20 10:49
Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.808		0.224	0.239		0.0362	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Actinium-227	-0.323	U	0.665	0.666		0.401	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Bismuth-212	-0.0492	U	0.853	0.853		0.698	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Bismuth-214	0.562		0.148	0.159		0.0503	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Cesium-137	0.0387	U	0.0767	0.0768	0.0700	0.0598	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Lead-210	-0.980	U	1.90	1.90		1.60	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Lead-212	0.489		0.0961	0.109		0.0455	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Lead-214	0.487		0.140	0.149		0.0593	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Potassium-40	8.01		1.74	1.92		0.534	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Protactinium-231	0.771	U	1.94	1.94		2.13	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Protactinium-234	0.155	U	0.173	0.173		0.165	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Radium-226	0.562		0.148	0.159	0.200	0.0503	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Radium-228	0.808		0.224	0.239		0.0362	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Thallium-208	0.186		0.0562	0.0593		0.0134	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Thorium 228	0.489		0.0961	0.109		0.0455	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Thorium-232	0.808		0.224	0.239		0.0362	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Thorium-234	0.172	U	0.568	0.568		0.457	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Uranium-235	-0.188	U	0.293	0.293		0.392	pCi/g	11/16/20 17:31	12/08/20 12:28	1
Uranium-238	0.172	U	0.568	0.568		0.457	pCi/g	11/16/20 17:31	12/08/20 12:28	1

Client Sample ID: HPPG-ESU-TU107A-018

Lab Sample ID: 160-40336-18

Matrix: Solid

Date Collected: 11/06/20 10:51
Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.629		0.163	0.175		0.0362	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Actinium-227	-0.110	U	0.617	0.617		0.379	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Bismuth-212	0.423	U	0.745	0.746		0.565	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Bismuth-214	0.370		0.112	0.118		0.0380	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Cesium-137	0.0273	U	0.0546	0.0547	0.0700	0.0415	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Lead-210	0.612	U	1.30	1.30		0.895	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Lead-212	0.436		0.0863	0.0976		0.0362	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Lead-214	0.397		0.111	0.119		0.0510	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Potassium-40	8.87		1.53	1.77		0.220	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Protactinium-231	-0.0322	U	1.97	1.97		1.62	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Protactinium-234	-0.00854	U	0.271	0.271		0.223	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Radium-226	0.370		0.112	0.118	0.200	0.0380	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Radium-228	0.629		0.163	0.175		0.0362	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thallium-208	0.180		0.0580	0.0608		0.0154	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thorium 228	0.436		0.0863	0.0976		0.0362	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thorium-232	0.629		0.163	0.175		0.0362	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thorium-234	0.337	U	0.455	0.457		0.385	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Uranium-235	0.146	U	0.349	0.350		0.343	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Uranium-238	0.337	U	0.455	0.457		0.385	pCi/g	11/16/20 17:31	12/08/20 06:40	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-019

Lab Sample ID: 160-40336-19

Date Collected: 11/06/20 10:53

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.360		0.157	0.161		0.0400	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Actinium-227	-0.173	U	0.626	0.627		0.381	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Bismuth-212	0.143	U	0.703	0.703		0.560	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Bismuth-214	0.318		0.169	0.172		0.0875	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Cesium-137	0.00245	U	0.0539	0.0539	0.0700	0.0438	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Lead-210	0.386	U		1.31		0.913	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Lead-212	0.398		0.0930	0.106		0.0421	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Lead-214	0.355		0.119	0.124		0.0686	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Potassium-40	7.57		1.49	1.68		0.272	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Protactinium-231	0.498	U		2.26		1.84	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Protactinium-234	0.0345	U		0.105		0.173	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Radium-226	0.318		0.169	0.172	0.200	0.0875	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Radium-228	0.360		0.157	0.161		0.0400	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thallium-208	0.227		0.0713	0.0750		0.0233	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thorium 228	0.398		0.0930	0.106		0.0421	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thorium-232	0.360		0.157	0.161		0.0400	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Thorium-234	-0.563	U	0.613	0.616		0.882	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Uranium-235	-0.0101	U	0.328	0.328		0.285	pCi/g	11/16/20 17:31	12/08/20 06:40	1
Uranium-238	-0.563	U	0.613	0.616		0.882	pCi/g	11/16/20 17:31	12/08/20 06:40	1

Client Sample ID: HPPG-ESU-TU107A-020

Lab Sample ID: 160-40336-20

Date Collected: 11/06/20 10:55

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.396		0.287	0.290		0.132	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Actinium-227	0.137	U	0.429	0.430		0.277	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Bismuth-212	0.359	U	0.680	0.681		0.520	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Bismuth-214	0.405		0.115	0.122		0.0423	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Cesium-137	-0.0534	U	0.0809	0.0811	0.0700	0.0625	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Lead-210	0.395	U		1.22		0.972	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Lead-212	0.279		0.0980	0.104		0.0635	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Lead-214	0.437		0.121	0.129		0.0506	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Potassium-40	7.19		1.33	1.52		0.250	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Protactinium-231	0.755	U		2.05		2.24	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Protactinium-234	0.100	U		0.274		0.222	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Radium-226	0.405		0.115	0.122	0.200	0.0423	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Radium-228	0.396		0.287	0.290		0.132	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Thallium-208	0.0567		0.111	0.112		0.0500	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Thorium 228	0.279		0.0980	0.104		0.0635	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Thorium-232	0.396		0.287	0.290		0.132	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Thorium-234	-0.865	U	0.846	0.851		0.867	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Uranium-235	0.103	U		0.193		0.395	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Uranium-238	-0.865	U	0.846	0.851		0.867	pCi/g	11/16/20 19:09	12/07/20 21:09	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-021

Lab Sample ID: 160-40336-21

Matrix: Solid

Date Collected: 11/06/20 10:58
Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.216		0.158	0.159	0.331	0.114	pCi/g	11/30/20 10:34	12/09/20 17:58	1
<i>Carrier</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	105		40 - 110					11/30/20 10:34	12/09/20 17:58	1
Y Carrier	92.0		40 - 110					11/30/20 10:34	12/09/20 17:58	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.00203	U	0.0122	0.0122	0.100	0.00944	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Plutonium-239/240	0.00203	U	0.0108	0.0108	0.100	0.00819	pCi/g	12/01/20 15:59	12/15/20 17:58	1
<i>Tracer</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Pu-242 (T)	97.6		30 - 110					12/01/20 15:59	12/15/20 17:58	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.311		0.0778	0.0820	0.250	0.0131	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-235/236	0.0150		0.0206	0.0207	0.100	0.00731	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-238	0.314		0.0767	0.0811	0.250	0.00587	pCi/g	12/01/20 16:11	12/16/20 18:08	1
<i>Tracer</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Uranium-232	88.9		30 - 110					12/01/20 16:11	12/16/20 18:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.486		0.173	0.180		0.108	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Actinium-227	0.428		0.423	0.425		0.237	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Bismuth-212	-0.0319	U	0.790	0.790		0.647	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Bismuth-214	0.382		0.125	0.131		0.0476	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Cesium-137	-0.0400	U	0.0898	0.0899	0.0700	0.0710	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Lead-210	-0.627	U	1.60	1.60		1.34	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Lead-212	0.379		0.0833	0.0922		0.0393	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Lead-214	0.442		0.109	0.118		0.0466	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Potassium-40	8.70		1.49	1.73		0.214	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Protactinium-231	-0.732	U	2.71	2.71		2.20	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Protactinium-234	0.0481	U	0.0962	0.0964		0.223	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Radium-226	0.382		0.125	0.131	0.200	0.0476	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Radium-228	0.486		0.173	0.180		0.108	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Thallium-208	0.169		0.0489	0.0519		0.00823	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Thorium 228	0.379		0.0833	0.0922		0.0393	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Thorium-232	0.486		0.173	0.180		0.108	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Thorium-234	0.178	U	0.470	0.471		0.375	pCi/g	11/16/20 19:09	12/07/20 21:13	1
Uranium-235	-0.217	U	0.376	0.376		0.449	pCi/g	11/16/20 19:09	12/07/20 21:13	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-021

Lab Sample ID: 160-40336-21

Date Collected: 11/06/20 10:58

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-238	0.178	U	0.470	0.471		0.375	pCi/g	11/16/20 19:09	12/07/20 21:13	1

Client Sample ID: HPPG-ESU-TU107A-022

Lab Sample ID: 160-40336-22

Date Collected: 11/06/20 11:01

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.481		0.149	0.157		0.0397	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Actinium-227	0.0769	U	0.171	0.171		0.328	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Bismuth-212	1.40		0.554	0.573		0.126	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Bismuth-214	0.472		0.148	0.156		0.0696	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Cesium-137	-0.0781	U	0.0908	0.0911	0.0700	0.0792	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Lead-210	-0.456	U	1.33	1.33		0.970	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Lead-212	0.528		0.100	0.121		0.0375	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Lead-214	0.395		0.118	0.125		0.0720	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Potassium-40	7.65		1.49	1.68		0.270	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Protactinium-231	0.436	U	1.72	1.72		2.20	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Protactinium-234	0.0359	U	0.0690	0.0691		0.202	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Radium-226	0.472		0.148	0.156	0.200	0.0696	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Radium-228	0.481		0.149	0.157		0.0397	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Thallium-208	0.136		0.0674	0.0688		0.0305	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Thorium 228	0.528		0.100	0.121		0.0375	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Thorium-232	0.481		0.149	0.157		0.0397	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Thorium-234	-0.432	U	0.555	0.557		1.11	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Uranium-235	0.116	U	0.270	0.270		0.242	pCi/g	11/16/20 19:09	12/07/20 21:11	1
Uranium-238	-0.432	U	0.555	0.557		1.11	pCi/g	11/16/20 19:09	12/07/20 21:11	1

Client Sample ID: HPPG-ESU-TU107A-023

Lab Sample ID: 160-40336-23

Date Collected: 11/06/20 11:04

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.191		0.236	0.237		0.144	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Actinium-227	0.0245	U	0.0556	0.0557		0.363	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Bismuth-212	-0.225	U	0.820	0.820		0.655	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Bismuth-214	-0.0753	U	0.146	0.146		0.192	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Cesium-137	-0.0419	U	0.0732	0.0734	0.0700	0.0567	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Lead-210	0.777	U	1.57	1.57		1.02	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Lead-212	0.365		0.0949	0.104		0.0529	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Lead-214	0.204		0.0796	0.0830		0.132	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Potassium-40	8.91		1.43	1.76		0.285	pCi/g	11/16/20 19:09	12/07/20 21:09	1
Protactinium-231	0.760	U	2.30	2.30		1.86	pCi/g	11/16/20 19:09	12/07/20 21:09	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-023
Date Collected: 11/06/20 11:04
Date Received: 11/11/20 09:05

Lab Sample ID: 160-40336-23
Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Protactinium-234	0.0109	U		0.0193	0.0193		0.275	pCi/g	11/16/20 19:09	12/07/20 21:09
Radium-226	-0.0753	U		0.146	0.146	0.200	0.192	pCi/g	11/16/20 19:09	12/07/20 21:09
Radium-228	0.191			0.236	0.237		0.144	pCi/g	11/16/20 19:09	12/07/20 21:09
Thallium-208	0.156			0.0694	0.0717		0.0313	pCi/g	11/16/20 19:09	12/07/20 21:09
Thorium 228	0.365			0.0949	0.104		0.0529	pCi/g	11/16/20 19:09	12/07/20 21:09
Thorium-232	0.191			0.236	0.237		0.144	pCi/g	11/16/20 19:09	12/07/20 21:09
Thorium-234	0.513			0.607	0.610		0.459	pCi/g	11/16/20 19:09	12/07/20 21:09
Uranium-235	-0.0216	U		0.312	0.312		0.495	pCi/g	11/16/20 19:09	12/07/20 21:09
Uranium-238	0.513			0.607	0.610		0.459	pCi/g	11/16/20 19:09	12/07/20 21:09

Client Sample ID: HPPG-ESU-TU107A-024

Lab Sample ID: 160-40336-24

Date Collected: 11/06/20 11:08

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.362			0.248	0.252		0.107	pCi/g	11/16/20 19:09	12/08/20 11:17
Actinium-227	0.0797	U		0.571	0.571		0.352	pCi/g	11/16/20 19:09	12/08/20 11:17
Bismuth-212	0.000	U		0.596	0.596		0.591	pCi/g	11/16/20 19:09	12/08/20 11:17
Bismuth-214	0.404			0.134	0.142		0.0673	pCi/g	11/16/20 19:09	12/08/20 11:17
Cesium-137	-0.0284	U		0.0722	0.0722	0.0700	0.0569	pCi/g	11/16/20 19:09	12/08/20 11:17
Lead-210	1.50			1.74	1.76		1.08	pCi/g	11/16/20 19:09	12/08/20 11:17
Lead-212	0.383			0.0912	0.102		0.0448	pCi/g	11/16/20 19:09	12/08/20 11:17
Lead-214	0.419			0.128	0.136		0.0725	pCi/g	11/16/20 19:09	12/08/20 11:17
Potassium-40	7.29			1.34	1.58		0.298	pCi/g	11/16/20 19:09	12/08/20 11:17
Protactinium-231	0.000	U		0.307	0.307		2.52	pCi/g	11/16/20 19:09	12/08/20 11:17
Protactinium-234	0.101	U		0.311	0.312		0.253	pCi/g	11/16/20 19:09	12/08/20 11:17
Radium-226	0.404			0.134	0.142	0.200	0.0673	pCi/g	11/16/20 19:09	12/08/20 11:17
Radium-228	0.362			0.248	0.252		0.107	pCi/g	11/16/20 19:09	12/08/20 11:17
Thallium-208	0.149			0.0792	0.0810		0.0384	pCi/g	11/16/20 19:09	12/08/20 11:17
Thorium 228	0.383			0.0912	0.102		0.0448	pCi/g	11/16/20 19:09	12/08/20 11:17
Thorium-232	0.362			0.248	0.252		0.107	pCi/g	11/16/20 19:09	12/08/20 11:17
Thorium-234	1.06			0.691	0.703		0.412	pCi/g	11/16/20 19:09	12/08/20 11:17
Uranium-235	0.0904	U		0.211	0.211		0.469	pCi/g	11/16/20 19:09	12/08/20 11:17
Uranium-238	1.06			0.691	0.703		0.412	pCi/g	11/16/20 19:09	12/08/20 11:17

Client Sample ID: HPPG-ESU-TU107A-025

Lab Sample ID: 160-40336-25

Date Collected: 11/06/20 11:12

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.464			0.167	0.174		0.0337	pCi/g	11/16/20 19:09	12/07/20 21:55
Actinium-227	-0.399	U		0.726	0.728		0.418	pCi/g	11/16/20 19:09	12/07/20 21:55

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-025
Date Collected: 11/06/20 11:12
Date Received: 11/11/20 09:05

Lab Sample ID: 160-40336-25
Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.0000000	U	0.804	0.804		0.662	pCi/g	11/16/20 19:09	12/07/20 21:55	1
	484									
Bismuth-214	0.339		0.129	0.133		0.0526	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Cesium-137	-0.0295	U	0.0582	0.0583	0.0700	0.0447	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Lead-210	0.225	U	1.38	1.38		1.11	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Lead-212	0.343		0.137	0.144		0.0659	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Lead-214	0.0589	U	0.152	0.152		0.118	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Potassium-40	8.98		1.48	1.74		0.251	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Protactinium-231	0.000	U	0.234	0.234		2.09	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Protactinium-234	0.123	U	0.208	0.208		0.202	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Radium-226	0.339		0.129	0.133	0.200	0.0526	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Radium-228	0.464		0.167	0.174		0.0337	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Thallium-208	0.102		0.0745	0.0753		0.0372	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Thorium 228	0.343		0.137	0.144		0.0659	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Thorium-232	0.464		0.167	0.174		0.0337	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Thorium-234	-0.429	U	0.861	0.863		1.01	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Uranium-235	-0.00761	U	0.261	0.261		0.375	pCi/g	11/16/20 19:09	12/07/20 21:55	1
Uranium-238	-0.429	U	0.861	0.863		1.01	pCi/g	11/16/20 19:09	12/07/20 21:55	1

Client Sample ID: HPPG-F-027

Lab Sample ID: 160-40336-26

Date Collected: 11/06/20 10:30
Date Received: 11/11/20 09:05

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.622		0.272	0.281		0.104	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Actinium-227	0.168	U	0.382	0.382		0.370	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Bismuth-212	0.240	U	0.796	0.797		0.633	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Bismuth-214	0.485		0.169	0.178		0.0621	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Cesium-137	-0.0259	U	0.0619	0.0620	0.0700	0.0483	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Lead-210	-0.925	U	1.49	1.49		1.27	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Lead-212	0.308		0.0933	0.100		0.0551	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Lead-214	0.410		0.0968	0.108		0.0500	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Potassium-40	8.22		1.39	1.68		0.291	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Protactinium-231	0.000	U	0.518	0.518		2.25	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Protactinium-234	-0.119	U	0.355	0.355		0.289	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Radium-226	0.485		0.169	0.178	0.200	0.0621	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Radium-228	0.622		0.272	0.281		0.104	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Thallium-208	0.164		0.0579	0.0609		0.0223	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Thorium 228	0.308		0.0933	0.100		0.0551	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Thorium-232	0.622		0.272	0.281		0.104	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Thorium-234	0.620		0.545	0.551		0.428	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Uranium-235	-0.0161	U	0.298	0.298		0.246	pCi/g	11/16/20 19:09	12/07/20 21:56	1
Uranium-238	0.620		0.545	0.551		0.428	pCi/g	11/16/20 19:09	12/07/20 21:56	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-F-028

Lab Sample ID: 160-40336-27

Date Collected: 11/06/20 10:58

Matrix: Solid

Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.182		0.135	0.136	0.331	0.0944	pCi/g	12/09/20 18:42	12/18/20 20:05	1
<i>Carrier</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	95.6		40 - 110					12/09/20 18:42	12/18/20 20:05	1
Y Carrier	97.6		40 - 110					12/09/20 18:42	12/18/20 20:05	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.00201	U	0.00900	0.00900	0.100	0.00662	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Plutonium-239/240	-0.00201	U	0.0107	0.0107	0.100	0.00937	pCi/g	12/01/20 15:59	12/15/20 17:58	1
<i>Tracer</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Pu-242 (T)	103		30 - 110					12/01/20 15:59	12/15/20 17:58	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.261		0.0823	0.0852	0.250	0.0297	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-235/236	0.0207		0.0272	0.0273	0.100	0.0117	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-238	0.317		0.0820	0.0862	0.250	0.00662	pCi/g	12/01/20 16:11	12/16/20 18:08	1
<i>Tracer</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Uranium-232	80.0		30 - 110					12/01/20 16:11	12/16/20 18:08	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.370		0.114	0.120		0.0356	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Actinium-227	-0.0473	U	0.754	0.754		0.280	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Bismuth-212	-0.240	U	0.420	0.421		0.508	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Bismuth-214	0.256		0.0822	0.0864		0.0361	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Cesium-137	0.0161	U	0.0323	0.0324	0.0700	0.0246	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Lead-210	0.0386	U	1.03	1.03		0.848	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Lead-212	0.347		0.0687	0.0820		0.0329	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Lead-214	0.315		0.115	0.119		0.0502	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Potassium-40	7.29		1.05	1.29		0.230	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Protactinium-231	-0.661	U	2.11	2.12		1.72	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Protactinium-234	0.0908	U	0.206	0.207		0.147	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Radium-226	0.256		0.0822	0.0864	0.200	0.0361	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Radium-228	0.370		0.114	0.120		0.0356	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Thallium-208	0.0922		0.0730	0.0736		0.0322	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Thorium 228	0.347		0.0687	0.0820		0.0329	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Thorium-232	0.370		0.114	0.120		0.0356	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Thorium-234	0.0757	U	0.847	0.847		0.696	pCi/g	11/20/20 14:56	12/11/20 09:35	1
Uranium-235	0.0512	U	0.148	0.149		0.281	pCi/g	11/20/20 14:56	12/11/20 09:35	1

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Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Client Sample ID: HPPG-F-028
Date Collected: 11/06/20 10:58
Date Received: 11/11/20 09:05

Lab Sample ID: 160-40336-27
Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-238	0.0757	U	0.847	0.847		0.696	pCi/g	11/20/20 14:56	12/11/20 09:35	1

Eurofins TestAmerica, St. Louis

QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-490555/21-A

Matrix: Solid

Analysis Batch: 491299

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490555

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.03921	U	0.147	0.147	0.331	0.118	pCi/g	11/30/20 10:37	12/09/20 17:59	1
Carrier										
Sr Carrier 105										
Y Carrier 92.3										

Lab Sample ID: LCS 160-490555/1-A

Matrix: Solid

Analysis Batch: 491328

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 490555

Analyte	Spike LCS LCS		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
	Spike Added	LCS Qualifier								
Strontium-90	7.76	6.009			0.646	0.331	0.105	pCi/g	77	75 - 125
Carrier										
Sr Carrier 105										
Y Carrier 93.1										

Lab Sample ID: MB 160-491323/23-A

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491323

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.07392	U	0.140	0.140	0.331	0.108	pCi/g	12/09/20 18:42	12/18/20 20:20	1
Carrier										
Sr Carrier 100										
Y Carrier 92.7										

Lab Sample ID: LCS 160-491323/1-A

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 491323

Analyte	Spike LCS LCS		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
	Spike Added	LCS Qualifier								
Strontium-90	7.76	5.897			0.638	0.331	0.109	pCi/g	76	75 - 125
Carrier										
Sr Carrier 100										
Y Carrier 99.8										

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QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-490638/1-A

Matrix: Solid

Analysis Batch: 492167

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490638

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Uranium-234	0.008286	U	0.0178	0.0178	0.250	0.0104	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-235/236	0.0000	U	0.00491	0.00491	0.100	0.00745	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Uranium-238	0.02048		0.0245	0.0245	0.250	0.0119	pCi/g	12/01/20 16:11	12/16/20 18:08	1
Tracer	MB MB		%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac		
	LCS	LCS								
Uranium-232	101				30 - 110	12/01/20 16:11	12/16/20 18:08	1		

Lab Sample ID: LCS 160-490638/2-A

Matrix: Solid

Analysis Batch: 492168

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 490638

Analyte	Spike		LCS Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	Limits
	Sample Result	Sample Qual									
Uranium-234	3.18		3.18	2.773		0.321	0.250	0.0191	pCi/g	87	84 - 120
Uranium-238			3.26	2.654		0.311	0.250	0.0258	pCi/g	82	82 - 122
Tracer	LCS	LCS	%Yield	Qualifier	Limits						
Uranium-232	115	Q			30 - 110						

Lab Sample ID: 160-40336-1 DU

Matrix: Solid

Analysis Batch: 492172

Client Sample ID: HPPG-ESU-TU107A-001

Prep Type: Total/NA

Prep Batch: 490638

Analyte	Sample		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	Limit
	Sample Result	Sample Qual								
Uranium-234	0.283		0.2812		0.0841	0.250	0.0262	pCi/g	0.01	1
Uranium-235/23	0.0449		-0.00152	U	0.0150	0.100	0.0133	pCi/g	0.81	1
Uranium-238	0.276		0.2635		0.0751	0.250	0.00617	pCi/g	0.08	1
Tracer	DU	DU	%Yield	Qualifier	Limits					
Uranium-232	103				30 - 110					

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-490636/1-A

Matrix: Solid

Analysis Batch: 492061

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490636

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Plutonium-238	-0.01140	U	0.0120	0.0121	0.100	0.0125	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Plutonium-239/240	-0.01141	U	0.0120	0.0121	0.100	0.0125	pCi/g	12/01/20 15:59	12/15/20 17:58	1
Tracer	MB	MB	%Yield	Qualifier	Limits					
Pu-242 (T)	92.3				30 - 110	12/01/20 15:59	12/15/20 17:58	1		

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QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-490636/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 492062

Prep Batch: 490636

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total			%Rec	%Rec. Limits
		Result	Qual		LOQ	DLC	Unit		
Plutonium-238	2.61	2.433		0.244	0.100	0.00605	pCi/g	93	80 - 125
Plutonium-239/2	2.64	2.450		0.246	0.100	0.00742	pCi/g	93	81 - 125
40									
Tracer		LCS	LCS						
Pu-242 (T)	%Yield	Qualifier	Limits						
	91.7		30 - 110						

Lab Sample ID: 160-40336-1 DU

Client Sample ID: HPPG-ESU-TU107A-001

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 492064

Prep Batch: 490636

Analyte	Sample		DU		Uncert. (2σ+/-)	Total			RER	Limit
	Result	Qual	Result	Qual		LOQ	DLC	Unit		
Plutonium-238	-0.0117	U	0.004137	U	0.0101	0.100	0.00681	pCi/g	0.75	1
Plutonium-239/2	-0.00195	U	0.0000	U	0.00828	0.100	0.00681	pCi/g	0.10	1
40										
Tracer		DU	DU							
Pu-242 (T)	%Yield	Qualifier	Limits							
	94.4		30 - 110							

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-489271/1-A

Client Sample ID: Method Blank

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 490986

Prep Batch: 489271

Analyte	MB Result	MB Qualifier	Count		Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Result	Uncert.								
Actinium 228	0.1303		0.168	0.168	0.106	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Actinium-227	0.2215		0.352	0.352	0.176	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Bismuth-212	-0.4683	U	0.921	0.922	0.700	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Bismuth-214	0.05670	U	0.0556	0.0559	0.160	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Cesium-137	0.002722	U	0.0826	0.0826	0.0700	0.0677	pCi/g	11/16/20 17:31	12/07/20 22:01	1		
Lead-210	-1.227	U	1.83	1.83	1.56	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Lead-212	-0.02147	U	0.0733	0.0733	0.0948	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Lead-214	0.02503	U	0.0764	0.0765	0.0577	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Potassium-40	0.2447	U	0.469	0.470	0.298	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Protactinium-231	0.0000	U	0.224	0.224	1.92	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Protactinium-234	0.1063	U	0.256	0.256	0.134	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Radium-226	0.05670	U	0.0556	0.0559	0.200	0.160	pCi/g	11/16/20 17:31	12/07/20 22:01	1		
Radium-228	0.1303		0.168	0.168	0.106	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Thallium-208	0.05269		0.102	0.102	0.0238	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Thorium 228	-0.02147	U	0.0733	0.0733	0.0948	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Thorium-232	0.1303		0.168	0.168	0.106	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Thorium-234	-1.156	U	0.509	0.525	0.740	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Uranium-235	-0.04770	U	0.275	0.275	0.268	pCi/g	11/16/20 17:31	12/07/20 22:01	1			
Uranium-238	-1.156	U	0.509	0.525	0.740	pCi/g	11/16/20 17:31	12/07/20 22:01	1			

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QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-489271/2-A
Matrix: Solid
Analysis Batch: 490985

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 489271

Analyte	Spike Added	LCS		Total Uncert.		LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	(2σ+/-)						
Americium-241	96.4	95.84		10.1			0.562	pCi/g	99	87 - 116
Cesium-137	26.7	27.25		2.94	0.0700		0.117	pCi/g	102	87 - 120
Cobalt-60	9.49	9.149		1.07			0.0186	pCi/g	96	87 - 115

Lab Sample ID: 160-40336-1 DU
Matrix: Solid
Analysis Batch: 490979

Client Sample ID: HPPG-ESU-TU107A-001
Prep Type: Total/NA
Prep Batch: 489271

Analyte	Sample		DU		Total		RER	Limit	
	Result	Qual	Result	Qual	Uncert.	(2σ+/-)			
Actinium 228	0.373		0.2721		0.117		0.102	pCi/g	0.42 1
Actinium-227	0.109	U	0.07351	U	0.333		0.269	pCi/g	0.05 1
Bismuth-212	-0.0121	U	-0.02623	U	0.548		0.399	pCi/g	0.01 1
Bismuth-214	0.281		0.1955		0.0791		0.0361	pCi/g	0.50 1
Cesium-137	-0.00897	U	0.001939	U	0.0419	0.0700	0.0344	pCi/g	0.11 1
Lead-210	0.557	U	-0.03276	U	0.952		0.782	pCi/g	0.27 1
Lead-212	0.303		0.3151		0.0765		0.0306	pCi/g	0.08 1
Lead-214	0.336		0.3455		0.0879		0.0408	pCi/g	0.05 1
Potassium-40	8.86		8.484		1.42		0.228	pCi/g	0.13 1
Protactinium-231	0.000	U	0.0000	U	0.222		1.57	pCi/g	0 1
Protactinium-234	0.0780	U	0.1081	U	0.183		0.145	pCi/g	0.11 1
Radium-226	0.281		0.1955		0.0791	0.200	0.0361	pCi/g	0.50 1
Radium-228	0.373		0.2721		0.117		0.102	pCi/g	0.42 1
Thallium-208	0.139		0.1190		0.0401		0.0134	pCi/g	0.25 1
Thorium 228	0.303		0.3151		0.0765		0.0306	pCi/g	0.08 1
Thorium-232	0.373		0.2721		0.117		0.102	pCi/g	0.42 1
Thorium-234	-0.0133	U	0.3223	U	0.653		0.705	pCi/g	0.49 1
Uranium-235	0.000	U	0.07053	U	0.221		0.289	pCi/g	0.19 1
Uranium-238	-0.0133	U	0.3223	U	0.653		0.705	pCi/g	0.49 1

Lab Sample ID: MB 160-489279/1-A
Matrix: Solid
Analysis Batch: 490979

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 489279

Analyte	MB		Count Uncert. (2σ+/-)	Total		LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier		Uncert. (2σ+/-)	Total Uncert. (2σ+/-)						
Actinium 228	-0.03762	U	0.218	0.218		0.113	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Actinium-227	-0.1086	U	0.451	0.451		0.238	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Bismuth-212	-0.03883	U	0.672	0.672		0.542	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Bismuth-214	-0.02835	U	0.195	0.195		0.161	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Cesium-137	0.02285	U	0.0449	0.0450	0.0700	0.0341	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Lead-210	-0.5417	U	1.02	1.02		0.800	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Lead-212	-0.01536	U	0.0682	0.0682		0.0807	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Lead-214	-0.01367	U	0.0860	0.0861		0.0710	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Potassium-40	0.1471	U	0.442	0.442		0.327	pCi/g	11/16/20 19:09	12/07/20 21:03		1
Protactinium-231	0.0000000	U	1.83	1.83		1.51	pCi/g	11/16/20 19:09	12/07/20 21:03		1
	2688										
Protactinium-234	0.04131	U	0.0780	0.0781		0.135	pCi/g	11/16/20 19:09	12/07/20 21:03		1

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QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-489279/1-A

Matrix: Solid

Analysis Batch: 490979

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 489279

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Radium-226	-0.02835	U		0.195	0.195	0.200	0.161	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Radium-228	-0.03762	U		0.218	0.218		0.113	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Thallium-208	0.02319			0.0374	0.0375		0.0208	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Thorium 228	-0.01536	U		0.0682	0.0682		0.0807	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Thorium-232	-0.03762	U		0.218	0.218		0.113	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Thorium-234	0.1297	U		0.551	0.551		0.447	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Uranium-235	0.08729	U		0.182	0.182		0.239	pCi/g	11/16/20 19:09	12/07/20 21:03	1	
Uranium-238	0.1297	U		0.551	0.551		0.447	pCi/g	11/16/20 19:09	12/07/20 21:03	1	

Lab Sample ID: LCS 160-489279/2-A

Matrix: Solid

Analysis Batch: 491150

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489279

Analyte	Spike Added	LCS Result	LCS Qual	Total			DLC	Unit	%Rec	%Rec.	
				Uncert.	(2σ+/-)	LOQ				Limits	
Americium-241	96.4	94.79		10.0			0.676	pCi/g	98	87 - 116	
Cesium-137	26.7	26.74		2.88		0.0700	0.116	pCi/g	100	87 - 120	
Cobalt-60	9.48	9.786		1.12			0.0423	pCi/g	103	87 - 115	

Lab Sample ID: 160-40336-20 DU

Matrix: Solid

Analysis Batch: 490979

Client Sample ID: HPPG-ESU-TU107A-020

Prep Type: Total/NA

Prep Batch: 489279

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total			DLC	Unit	RER	Limit
					Uncert.	(2σ+/-)	LOQ				
Actinium 228	0.396		0.5018		0.142			0.0205	pCi/g	0.24	1
Actinium-227	0.137	U	0.1034	U	0.207			0.254	pCi/g	0.05	1
Bismuth-212	0.359	U	-0.1923	U	0.640			0.481	pCi/g	0.42	1
Bismuth-214	0.405		0.3734		0.107			0.0396	pCi/g	0.14	1
Cesium-137	-0.0534	U	0.01786	U	0.0361		0.0700	0.0277	pCi/g	0.61	1
Lead-210	0.395	U	0.3635	U	1.28			1.04	pCi/g	0.01	1
Lead-212	0.279		0.3373		0.0822			0.0351	pCi/g	0.31	1
Lead-214	0.437		0.4125		0.0930			0.0449	pCi/g	0.11	1
Potassium-40	7.19		8.001		1.37			0.230	pCi/g	0.28	1
Protactinium-231	0.755	U	-0.6136	U	1.65			1.33	pCi/g	0.37	1
Protactinium-234	0.100	U	0.07081	U	0.203			0.165	pCi/g	0.06	1
Radium-226	0.405		0.3734		0.107		0.200	0.0396	pCi/g	0.14	1
Radium-228	0.396		0.5018		0.142			0.0205	pCi/g	0.24	1
Thallium-208	0.0567		0.1479		0.0453			0.0144	pCi/g	0.58	1
Thorium 228	0.279		0.3373		0.0822			0.0351	pCi/g	0.31	1
Thorium-232	0.396		0.5018		0.142			0.0205	pCi/g	0.24	1
Thorium-234	-0.865	U	-0.2879	U	0.953			0.778	pCi/g	0.32	1
Uranium-235	0.103	U	-0.01934	U	0.0338			0.371	pCi/g	0.54	1
Uranium-238	-0.865	U	-0.2879	U	0.953			0.778	pCi/g	0.32	1

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QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-489844/1-A

Matrix: Solid

Analysis Batch: 491443

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 489844

Analyte	MB	MB	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.						
Actinium 228	0.04908	U		0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Actinium-227	0.06310	U		0.159	0.159		0.330	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-212	0.0000	U		0.133	0.133		0.335	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-214	-0.008210	U		0.114	0.114		0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Cesium-137	0.007259	U		0.0689	0.0689	0.0700	0.0558	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-210	1.261			1.60	1.61		1.05	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-212	0.01003	U		0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-214	0.03327	U		0.0785	0.0786		0.0761	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Potassium-40	-0.5926	U		0.723	0.726		0.723	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-231	0.3075	U		0.995	0.995		0.778	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-234	0.03644	U		0.0817	0.0817		0.166	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-226	-0.008210	U		0.114	0.114	0.200	0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-228	0.04908	U		0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thallium-208	0.04141			0.0370	0.0373		0.0238	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium 228	0.01003	U		0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-232	0.04908	U		0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-234	-1.112	U		0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-235	-0.04770	U		0.334	0.334		0.304	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-238	-1.112	U		0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1

Lab Sample ID: LCS 160-489844/2-A

Matrix: Solid

Analysis Batch: 491441

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489844

Analyte	Spike	LCS	LCS	Qualifier	Total	Uncert.	(2σ+/-)	LOQ	DLC	Unit	%Rec.	Limits
	Added	Result	Qual		(2σ+/-)							
Americium-241	96.4	97.37			10.2				0.588	pCi/g	101	87 - 116
Cesium-137	26.7	26.30			2.84	0.0700			0.0907	pCi/g	98	87 - 120
Cobalt-60	9.47	9.183			0.997				0.0186	pCi/g	97	87 - 115

Eurofins TestAmerica, St. Louis

QC Association Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Rad

Leach Batch: 488950

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	Dry and Grind	
160-40336-2	HPPG-ESU-TU107A-002	Total/NA	Solid	Dry and Grind	
160-40336-1 DU	HPPG-ESU-TU107A-001	Total/NA	Solid	Dry and Grind	

Leach Batch: 488964

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-3	HPPG-ESU-TU107A-003	Total/NA	Solid	Dry and Grind	
160-40336-4	HPPG-ESU-TU107A-004	Total/NA	Solid	Dry and Grind	
160-40336-5	HPPG-ESU-TU107A-005	Total/NA	Solid	Dry and Grind	
160-40336-6	HPPG-ESU-TU107A-006	Total/NA	Solid	Dry and Grind	
160-40336-7	HPPG-ESU-TU107A-007	Total/NA	Solid	Dry and Grind	
160-40336-8	HPPG-ESU-TU107A-008	Total/NA	Solid	Dry and Grind	
160-40336-9	HPPG-ESU-TU107A-009	Total/NA	Solid	Dry and Grind	
160-40336-10	HPPG-ESU-TU107A-010	Total/NA	Solid	Dry and Grind	
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	Dry and Grind	
160-40336-12	HPPG-ESU-TU107A-012	Total/NA	Solid	Dry and Grind	
160-40336-13	HPPG-ESU-TU107A-013	Total/NA	Solid	Dry and Grind	
160-40336-14	HPPG-ESU-TU107A-014	Total/NA	Solid	Dry and Grind	
160-40336-15	HPPG-ESU-TU107A-015	Total/NA	Solid	Dry and Grind	
160-40336-16	HPPG-ESU-TU107A-016	Total/NA	Solid	Dry and Grind	
160-40336-17	HPPG-ESU-TU107A-017	Total/NA	Solid	Dry and Grind	
160-40336-18	HPPG-ESU-TU107A-018	Total/NA	Solid	Dry and Grind	
160-40336-19	HPPG-ESU-TU107A-019	Total/NA	Solid	Dry and Grind	
160-40336-20	HPPG-ESU-TU107A-020	Total/NA	Solid	Dry and Grind	
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	Dry and Grind	
160-40336-22	HPPG-ESU-TU107A-022	Total/NA	Solid	Dry and Grind	
160-40336-23	HPPG-ESU-TU107A-023	Total/NA	Solid	Dry and Grind	
160-40336-24	HPPG-ESU-TU107A-024	Total/NA	Solid	Dry and Grind	
160-40336-25	HPPG-ESU-TU107A-025	Total/NA	Solid	Dry and Grind	
160-40336-26	HPPG-F-027	Total/NA	Solid	Dry and Grind	
160-40336-20 DU	HPPG-ESU-TU107A-020	Total/NA	Solid	Dry and Grind	

Leach Batch: 489020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-27	HPPG-F-028	Total/NA	Solid	Dry and Grind	

Prep Batch: 489271

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	Fill_Geo-21	488950
160-40336-2	HPPG-ESU-TU107A-002	Total/NA	Solid	Fill_Geo-21	488950
160-40336-3	HPPG-ESU-TU107A-003	Total/NA	Solid	Fill_Geo-21	488964
160-40336-4	HPPG-ESU-TU107A-004	Total/NA	Solid	Fill_Geo-21	488964
160-40336-5	HPPG-ESU-TU107A-005	Total/NA	Solid	Fill_Geo-21	488964
160-40336-6	HPPG-ESU-TU107A-006	Total/NA	Solid	Fill_Geo-21	488964
160-40336-7	HPPG-ESU-TU107A-007	Total/NA	Solid	Fill_Geo-21	488964
160-40336-8	HPPG-ESU-TU107A-008	Total/NA	Solid	Fill_Geo-21	488964
160-40336-9	HPPG-ESU-TU107A-009	Total/NA	Solid	Fill_Geo-21	488964
160-40336-10	HPPG-ESU-TU107A-010	Total/NA	Solid	Fill_Geo-21	488964
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	Fill_Geo-21	488964
160-40336-12	HPPG-ESU-TU107A-012	Total/NA	Solid	Fill_Geo-21	488964
160-40336-13	HPPG-ESU-TU107A-013	Total/NA	Solid	Fill_Geo-21	488964

Eurofins TestAmerica, St. Louis

QC Association Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Rad (Continued)

Prep Batch: 489271 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-14	HPPG-ESU-TU107A-014	Total/NA	Solid	Fill_Geo-21	488964
160-40336-15	HPPG-ESU-TU107A-015	Total/NA	Solid	Fill_Geo-21	488964
160-40336-16	HPPG-ESU-TU107A-016	Total/NA	Solid	Fill_Geo-21	488964
160-40336-17	HPPG-ESU-TU107A-017	Total/NA	Solid	Fill_Geo-21	488964
160-40336-18	HPPG-ESU-TU107A-018	Total/NA	Solid	Fill_Geo-21	488964
160-40336-19	HPPG-ESU-TU107A-019	Total/NA	Solid	Fill_Geo-21	488964
MB 160-489271/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489271/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40336-1 DU	HPPG-ESU-TU107A-001	Total/NA	Solid	Fill_Geo-21	488950

Prep Batch: 489279

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-20	HPPG-ESU-TU107A-020	Total/NA	Solid	Fill_Geo-21	488964
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	Fill_Geo-21	488964
160-40336-22	HPPG-ESU-TU107A-022	Total/NA	Solid	Fill_Geo-21	488964
160-40336-23	HPPG-ESU-TU107A-023	Total/NA	Solid	Fill_Geo-21	488964
160-40336-24	HPPG-ESU-TU107A-024	Total/NA	Solid	Fill_Geo-21	488964
160-40336-25	HPPG-ESU-TU107A-025	Total/NA	Solid	Fill_Geo-21	488964
160-40336-26	HPPG-F-027	Total/NA	Solid	Fill_Geo-21	488964
MB 160-489279/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489279/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40336-20 DU	HPPG-ESU-TU107A-020	Total/NA	Solid	Fill_Geo-21	488964

Prep Batch: 489844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-27	HPPG-F-028	Total/NA	Solid	Fill_Geo-21	489020
MB 160-489844/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489844/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490555

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	DPS-7	488950
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	DPS-7	488964
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	DPS-7	488964
MB 160-490555/21-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490555/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Prep Batch: 490636

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	ExtChrom	488950
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	ExtChrom	490641
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	ExtChrom	488964
160-40336-27	HPPG-F-028	Total/NA	Solid	ExtChrom	489020
MB 160-490636/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-490636/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40336-1 DU	HPPG-ESU-TU107A-001	Total/NA	Solid	ExtChrom	488950

Prep Batch: 490638

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	ExtChrom	488950
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	ExtChrom	490641

Eurofins TestAmerica, St. Louis

QC Association Summary

Page 108 of 143

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Rad (Continued)

Prep Batch: 490638 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	ExtChrom	488964
160-40336-27	HPPG-F-028	Total/NA	Solid	ExtChrom	489020
MB 160-490638/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-490638/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40336-1 DU	HPPG-ESU-TU107A-001	Total/NA	Solid	ExtChrom	488950

Leach Batch: 490641

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	Dry and Grind	

Prep Batch: 491323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-27	HPPG-F-028	Total/NA	Solid	DPS-7	489020
MB 160-491323/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-491323/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Eurofins TestAmerica, St. Louis

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-1
SDG: GJ46599772

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr (40-110)	Y (40-110)
160-40336-1	HPPG-ESU-TU107A-001	101	95.7
160-40336-11	HPPG-ESU-TU107A-011	102	94.6
160-40336-21	HPPG-ESU-TU107A-021	105	92.0
160-40336-27	HPPG-F-028	95.6	97.6
LCS 160-490555/1-A	Lab Control Sample	105	93.1
LCS 160-491323/1-A	Lab Control Sample	100	99.8
MB 160-490555/21-A	Method Blank	105	92.3
MB 160-491323/23-A	Method Blank	100	92.7

Tracer/Carrier Legend

Sr = Sr Carrier
Y = Y Carrier

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Pu-242 (T) (30-110)	
160-40336-1	HPPG-ESU-TU107A-001	89.7	
160-40336-1 DU	HPPG-ESU-TU107A-001	94.4	
160-40336-11	HPPG-ESU-TU107A-011	90.9	
160-40336-21	HPPG-ESU-TU107A-021	97.6	
160-40336-27	HPPG-F-028	103	
LCS 160-490636/2-A	Lab Control Sample	91.7	
MB 160-490636/1-A	Method Blank	92.3	

Tracer/Carrier Legend

Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		U-232 (30-110)	
160-40336-1	HPPG-ESU-TU107A-001	100	
160-40336-1 DU	HPPG-ESU-TU107A-001	103	
160-40336-11	HPPG-ESU-TU107A-011	96.5	
160-40336-21	HPPG-ESU-TU107A-021	88.9	
160-40336-27	HPPG-F-028	80.0	
LCS 160-490638/2-A	Lab Control Sample	115 Q	
MB 160-490638/1-A	Method Blank	101	

Tracer/Carrier Legend

U-232 = Uranium-232

Eurofins TestAmerica, St. Louis



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40336-2
Laboratory Sample Delivery Group: GJ46599772
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/13/2021 2:22:01 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Job ID: 160-40336-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40336-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Job ID: 160-40336-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 12.1 C.

Additional analysis requested and not listed on the COC.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21) and HPPG-F-028 (160-40336-27) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were dried on 12/28/2020, prepared on 12/28/2020 and analyzed on 01/07/2021.

A blank population correction was applied to account for contributions to the analyte count rate from sources other than the sample itself. Interferences may include, but are not limited to, impurities in reagents, tracers, or glassware, or effects due to the measurement process (such as tailing or crosstalk). HPPG-ESU-TU107A-001 (160-40336-1), HPPG-ESU-TU107A-011 (160-40336-11), HPPG-ESU-TU107A-021 (160-40336-21), HPPG-F-028 (160-40336-27), (LCS 160-493185/2-A), (MB 160-493185/1-A) and (160-40336-A-1-P DU)

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-493185/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



GPTM Federal Services LLC

CHAIN OF CUSTODY

Ref. Document # S01197RSY-025

*** Last 3 transfers shown above. Complete list of transfers on last page ***



CHAIN OF CUSTODY

Ref. Document # 501197RSY-025

Page 2 of 4

APTIM Federal Services, LLC
4005 Fair Chicago Hwy
Concord, CA 94520

Project Number: 501197		Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action		Analysis Requested	
Project Location: San Francisco, CA					
Purchase Order #: 1159058					
Shipment/Pickup Date: 11/10/2020					
Waybill Number: 445369755947					
Test America (St. Louis Lab)					
Lab Destination: 13715 Rider Trail North Earth City, MO 63046					
Lab Contact Name/Ph# Rhonda Ridenhower (314)298-8566					
Sample Lead Lewis, Devin					
Sample Tech(s): Paul LeBlanc Andrew Muri					
Collection Information					
Sample ID	Date	Time	Method	Matrix	Container Type
HPPGESU-TU107A-008	11/6/2020	10:30	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-010	11/6/2020	10:31	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-011	11/6/2020	10:34	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-012	11/6/2020	10:37	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-013	11/6/2020	10:39	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-014	11/6/2020	10:42	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-015	11/6/2020	10:44	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-016	11/6/2020	10:47	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-017	11/6/2020	10:49	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-018	11/6/2020	10:51	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-019	11/6/2020	10:53	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-020	11/6/2020	10:55	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-021	11/6/2020	10:58	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-022	11/6/2020	11:01	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-023	11/6/2020	11:04	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-024	11/6/2020	11:08	G	SO	1 16 oz. plastic jar
HPPGESU-TU107A-025	11/6/2020	11:12	G	SO	1 16 oz. plastic jar



APRIL EDITION 1910

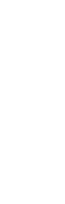
CHAIN OF CUSTODY

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Ref. Document # 501197RSY-025

All Transfers for COC 501197RSY-025

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Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/08/2020 16:21	Locked Storage (Rklipack)		11/08/2020 16:21
Locked Storage (Rklipack)		11/10/2020 13:04	Andrew Murni		11/10/2020 13:04
Andrew Murni		11/10/2020 13:20	SARAH HALEY		Michael Conning 11/11/2020 09:05

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40336-2

SDG Number: GJ46599772

Login Number: 40336**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Korrinhizer, Micha L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

Sample Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40336-1	HPPG-ESU-TU107A-001	Solid	11/06/20 09:55	11/11/20 09:05	
160-40336-11	HPPG-ESU-TU107A-011	Solid	11/06/20 10:34	11/11/20 09:05	
160-40336-21	HPPG-ESU-TU107A-021	Solid	11/06/20 10:58	11/11/20 09:05	
160-40336-27	HPPG-F-028	Solid	11/06/20 10:58	11/11/20 09:05	

Eurofins TestAmerica, St. Louis

Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Client Sample ID: HPPG-ESU-TU107A-001

Lab Sample ID: 160-40336-1

Date Collected: 11/06/20 09:55
Date Received: 11/11/20 09:05

Matrix: Solid

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Thorium-228	0.304		0.0624	0.0675	0.250	0.0248	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-230	0.225		0.0604	0.0633	0.250	0.0242	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-232	0.309		0.0529	0.0589	0.250	0.00818	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Tracer	%Yield	Qualifier	Limits						Prepared	Analyzed
Thorium-229	80.6		30 - 110						12/28/20 14:18	01/07/21 12:53
										1

Client Sample ID: HPPG-ESU-TU107A-011

Lab Sample ID: 160-40336-11

Date Collected: 11/06/20 10:34
Date Received: 11/11/20 09:05

Matrix: Solid

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Thorium-228	0.320		0.0618	0.0674	0.250	0.0206	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-230	0.308		0.0679	0.0726	0.250	0.0261	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-232	0.363		0.0589	0.0663	0.250	0.0111	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Tracer	%Yield	Qualifier	Limits						Prepared	Analyzed
Thorium-229	76.9		30 - 110						12/28/20 14:18	01/07/21 12:53
										1

Client Sample ID: HPPG-ESU-TU107A-021

Lab Sample ID: 160-40336-21

Date Collected: 11/06/20 10:58
Date Received: 11/11/20 09:05

Matrix: Solid

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Thorium-228	0.433		0.0735	0.0820	0.250	0.0248	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-230	0.415		0.0788	0.0862	0.250	0.0303	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-232	0.383		0.0750	0.0816	0.250	0.0363	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Tracer	%Yield	Qualifier	Limits						Prepared	Analyzed
Thorium-229	71.3		30 - 110						12/28/20 14:18	01/07/21 12:53
										1

Client Sample ID: HPPG-F-028

Lab Sample ID: 160-40336-27

Date Collected: 11/06/20 10:58
Date Received: 11/11/20 09:05

Matrix: Solid

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Thorium-228	0.350		0.0626	0.0691	0.250	0.0177	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-230	0.257		0.0633	0.0669	0.250	0.0245	pCi/g	12/28/20 14:18	01/07/21 12:53	1
Thorium-232	0.385		0.0593	0.0676	0.250	0.00828	pCi/g	12/28/20 14:18	01/07/21 12:53	1

Eurofins TestAmerica, St. Louis

Client Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Client Sample ID: HPPG-F-028
Date Collected: 11/06/20 10:58
Date Received: 11/11/20 09:05

Lab Sample ID: 160-40336-27
Matrix: Solid

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	81.3		30 - 110	12/28/20 14:18	01/07/21 12:53	1

Eurofins TestAmerica, St. Louis

QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-493185/1-A

Matrix: Solid

Analysis Batch: 494293

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 493185

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)		LOQ	DLC	Unit	Prepared		Dil Fac
	Result	MB		Qualifier	Result				Prepared	Analyzed	
Thorium-228	-0.03914	U	0.0280	0.0282	0.250	0.0230	pCi/g	12/28/20 14:18	01/07/21 12:53	1	
Thorium-230	-0.03669	U	0.0350	0.0351	0.250	0.0230	pCi/g	12/28/20 14:18	01/07/21 12:53	1	
Thorium-232	-0.007100	U	0.00904	0.00906	0.250	0.00744	pCi/g	12/28/20 14:18	01/07/21 12:53	1	
Tracer	MB		%Yield	MB		Limits	Prepared	Analyzed	Dil Fac		
	Spike	MB		Qualifier	MB						
Thorium-229	88.9				30 - 110		12/28/20 14:18	01/07/21 12:53	1		

Lab Sample ID: LCS 160-493185/2-A

Matrix: Solid

Analysis Batch: 494294

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 493185

Analyte	Spike		LCS Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)		LOQ	DLC	Unit	%Rec.	Limits
	Result	MB				(2σ+/-)	Result					
Thorium-230		24.5		22.58		1.99		0.250	0.0357	pCi/g	92	81 - 118
Tracer	LCS		%Yield	LCS		Limits	Prepared	Analyzed	Dil Fac			
	Spike	MB		Qualifier	MB							
Thorium-229	85.5				30 - 110							

Lab Sample ID: 160-40336-1 DU

Matrix: Solid

Analysis Batch: 494297

Client Sample ID: HPPG-ESU-TU107A-001

Prep Type: Total/NA

Prep Batch: 493185

Analyte	Sample		DU Result	DU Qual	Total Uncert. (2σ+/-)		LOQ	DLC	Unit	RER	Limit
	Result	Sample Qual			(2σ+/-)	Result					
Thorium-228	0.304		0.2043		0.0574	0.250	0.0252	pCi/g		0.80	1
Thorium-230	0.225		0.2965		0.0689	0.250	0.0239	pCi/g		0.54	1
Thorium-232	0.309		0.3175		0.0595	0.250	0.00803	pCi/g		0.07	1
Tracer	DU		%Yield	DU		Limits	Prepared	Analyzed	Dil Fac		
	Spike	MB		Qualifier	MB						
Thorium-229	84.7				30 - 110						

Eurofins TestAmerica, St. Louis

QC Association Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Rad

Prep Batch: 493185

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	ExtChrom	493202
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	ExtChrom	493203
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	ExtChrom	493204
160-40336-27	HPPG-F-028	Total/NA	Solid	ExtChrom	493205
MB 160-493185/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-493185/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40336-1 DU	HPPG-ESU-TU107A-001	Total/NA	Solid	ExtChrom	493202

Leach Batch: 493202

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-1	HPPG-ESU-TU107A-001	Total/NA	Solid	Dry and Grind	
160-40336-1 DU	HPPG-ESU-TU107A-001	Total/NA	Solid	Dry and Grind	

Leach Batch: 493203

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-11	HPPG-ESU-TU107A-011	Total/NA	Solid	Dry and Grind	

Leach Batch: 493204

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-21	HPPG-ESU-TU107A-021	Total/NA	Solid	Dry and Grind	

Leach Batch: 493205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40336-27	HPPG-F-028	Total/NA	Solid	Dry and Grind	

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40336-2
SDG: GJ46599772

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Th-229 (30-110)
160-40336-1	HPPG-ESU-TU107A-001	80.6
160-40336-1 DU	HPPG-ESU-TU107A-001	84.7
160-40336-11	HPPG-ESU-TU107A-011	76.9
160-40336-21	HPPG-ESU-TU107A-021	71.3
160-40336-27	HPPG-F-028	81.3
LCS 160-493185/2-A	Lab Control Sample	85.5
MB 160-493185/1-A	Method Blank	88.9

Tracer/Carrier Legend

Th-229 = Thorium-229

Eurofins TestAmerica, St. Louis

Engel, Audrey

From: Engel, Audrey
Sent: Tuesday, December 22, 2020 7:38 AM
To: Ridenhower, Rhonda
Subject: 40336 analysis addition

Hi Rhonda, can you add Th-232 via Alpha Spec to samples 001, 011, 021, and HPPG-F-028 in job 4033, please?

Audrey Engel

Chemist

M 916 317 5546

E audrey.engel@aptim.com



200 Fisher Ave.
Hunters Point Naval Shipyard
San Francisco, CA 94124

APTIM.com



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40337-1
Laboratory Sample Delivery Group: D1189461
Client Project/Site: HPNS-Parcel G 501197
Revision: 2

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/8/2021 4:25:11 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Job ID: 160-40337-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40337-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Updated isotopic thorium to report DLC.

Revision 2- Additional information requested in case narrative for total strontium

Case Narrative

Page 131 of 143

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Job ID: 160-40337-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.1 C.

STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU107A-B-001 (160-40337-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 12/01/2020 and analyzed on 12/10/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU107A-B-001 (160-40337-1).

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490603/21-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU107A-B-001 (160-40337-1) was analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were dried on 11/13/2020, prepared on 12/01/2020 and analyzed on 12/16/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490633/1-A)

A blank population correction was applied to account for contributions to the analyte count rate from sources other than the sample itself. Interferences may include, but are not limited to, impurities in reagents, tracers, or glassware, or effects due to the measurement process (such as tailing or crosstalk). HPPG-ESU-TU107A-B-001 (160-40337-1), (LCS 160-490633/2-A), (MB 160-490633/1-A) and (160-40337-A-1-E DU)

Samples for this batch were counted on 12/16/2020. The initial calibration (IC) was performed 12/11/2020 therefore the Monthly calibration verification (CCV) was not needed and is not in the deliverable. HPPG-ESU-TU107A-B-001 (160-40337-1), (LCS 160-490633/2-A), (MB 160-490633/1-A) and (160-40337-A-1-E DU)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU107A-B-001 (160-40337-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/13/2020, prepared on 11/20/2020 and analyzed on 12/11/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224

Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Job ID: 160-40337-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489844 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489844/1-A)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (MB 160-489844/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-027

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APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520Project Manager: Lisa Bercik
Phone #: (619)213-3389Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc
Joaquin Ramirez

Project Number: 501197		Analysis Requested																											
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action																													
Project Location: San Francisco, CA																													
Purchase Order #: 1159058																													
Shipment/Pickup Date: 11/10/2020																													
Waybill Number: 9957 0225 5993																													
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046																													
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566																													
		<table border="1"> <tr> <td rowspan="3">Matrix</td> <td rowspan="3"># of Contaminants</td> <td>Gamma Spec (EPA 901.1M) - Full 21 day ingrowth gamma</td> <td rowspan="3">Strontium-90 (EPA 905 M0D)</td> <td rowspan="3">Isotope Th(228-228, 232)</td> <td rowspan="3">Dose Rate uR/Hr</td> <td rowspan="3">Evidence Bag ID</td> <td rowspan="3">Comment</td> </tr> <tr> <td>Preservatives (water)</td> </tr> <tr> <td>Preservatives (soil)</td> </tr> <tr> <td colspan="2">Container Type</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										Matrix	# of Contaminants	Gamma Spec (EPA 901.1M) - Full 21 day ingrowth gamma	Strontium-90 (EPA 905 M0D)	Isotope Th(228-228, 232)	Dose Rate uR/Hr	Evidence Bag ID	Comment	Preservatives (water)	Preservatives (soil)	Container Type							
Matrix	# of Contaminants	Gamma Spec (EPA 901.1M) - Full 21 day ingrowth gamma	Strontium-90 (EPA 905 M0D)	Isotope Th(228-228, 232)	Dose Rate uR/Hr	Evidence Bag ID	Comment																						
		Preservatives (water)																											
		Preservatives (soil)																											
Container Type																													
Sample ID	Date	Time	Method																										
HPPG-ESU-TU107A-B-001	11/7/2020	09:37	G	SO	1	16 oz. plastic jar	X	X	X	S																			

Special Instructions:

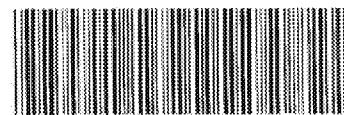
21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; Sc = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/07/2020 15:06	Locked Storage (RKilpack)		11/07/2020 15:06
Locked Storage (RKilpack)		11/10/2020 13:02	Andrew Murri		11/10/2020 13:02
Andrew Murri		11/10/2020 13:21	SHIPPED TO LAB natek		11/10/2020 09:05

*** Last 3 transfers shown above - Complete list of transfers on last page ***



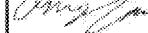
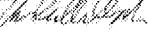
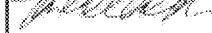
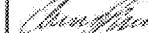
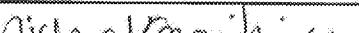
160-40337 Chain of Custody



ED_006360A_00000405-00133

All Transfers for COC 501197RSY-027

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murni, Andrew		11/07/2020 15:06	Locked Storage (RKillpack)		11/07/2020 15:06
Locked Storage (RKillpack)		11/10/2020 13:02	Andrew Murni		11/10/2020 13:02
Andrew Murni		11/10/2020 13:21	SHIPPED TO LAB via FedEx		11/11/2020 09:05

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40337-1
SDG Number: D1189461**Login Number:** 40337**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Korrinhizer, Micha L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Page 138 of 143

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40337-1	HPPG-ESU-TU107A-B-001	Solid	11/07/20 09:37	11/11/20 09:05	

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 139 of 143

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Client Sample ID: HPPG-ESU-TU107A-B-001

Lab Sample ID: 160-40337-1

Matrix: Solid

Date Collected: 11/07/20 09:37
Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.0868	U	0.151	0.151	0.331	0.117	pCi/g	12/01/20 10:36	12/10/20 17:49	1
Carrier	%Yield	Qualifier	Limits						Prepared	Analyzed
Sr Carrier	102		40 - 110						12/01/20 10:36	12/10/20 17:49
Y Carrier	90.5		40 - 110						12/01/20 10:36	12/10/20 17:49

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Thorium-228	0.373		0.0994	0.104	0.250	0.0280	pCi/g	12/01/20 15:11	12/16/20 18:21	1
Thorium-230	0.397		0.116	0.121	0.250	0.0461	pCi/g	12/01/20 15:11	12/16/20 18:21	1
Thorium-232	0.344		0.0881	0.0927	0.250	0.0153	pCi/g	12/01/20 15:11	12/16/20 18:21	1
Tracer	%Yield	Qualifier	Limits						Prepared	Analyzed
Thorium-229	77.4		30 - 110						12/01/20 15:11	12/16/20 18:21

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.428		0.174	0.180		0.111	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Actinium-227	0.123	U	0.349	0.349		0.281	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Bismuth-212	0.445	U	0.863	0.864		0.671	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Bismuth-214	0.339		0.123	0.128		0.0641	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Cesium-137	-0.00994	U	0.0596	0.0597	0.0700	0.0481	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Lead-210	0.539	U	1.52	1.53		1.22	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Lead-212	0.337		0.0873	0.0976		0.0462	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Lead-214	0.410		0.120	0.127		0.0592	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Potassium-40	9.18		1.50	1.77		0.253	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Protactinium-231	-0.166	U	2.72	2.73		2.24	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Protactinium-234	0.0989	U	0.264	0.264		0.214	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Radium-226	0.339		0.123	0.128	0.200	0.0641	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Radium-228	0.428		0.174	0.180		0.111	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Thallium-208	0.149		0.0652	0.0671		0.0273	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Thorium 228	0.337		0.0873	0.0976		0.0462	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Thorium-232	0.428		0.174	0.180		0.111	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Thorium-234	-0.433	U	0.835	0.836		1.08	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Uranium-235	0.111	U	0.213	0.214		0.398	pCi/g	11/20/20 14:56	12/11/20 09:10	1
Uranium-238	-0.433	U	0.835	0.836		1.08	pCi/g	11/20/20 14:56	12/11/20 09:10	1

Eurofins TestAmerica, St. Louis

QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-490603/21-A

Matrix: Solid

Analysis Batch: 491401

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490603

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.1284	U	0.224	0.224	0.331	0.175	pCi/g	12/01/20 10:36	12/10/20 17:33	1
Carrier										
Sr Carrier										
Y Carrier										

Lab Sample ID: LCS 160-490603/1-A

Matrix: Solid

Analysis Batch: 491432

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 490603

Analyte	MB	MB	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	Limits
	Result	Qualifier									
Strontium-90	7.76		7.76	6.228		0.666	0.331	0.106	pCi/g	80	75 - 125
Carrier											
Sr Carrier											
Y Carrier											

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-490633/1-A

Matrix: Solid

Analysis Batch: 492223

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490633

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Thorium-228	-0.03217	U	0.0341	0.0342	0.250	0.0264	pCi/g	12/01/20 15:11	12/16/20 18:21	1
Thorium-230	-0.01742	U	0.0581	0.0581	0.250	0.0361	pCi/g	12/01/20 15:11	12/16/20 18:21	1
Thorium-232	-0.006329	U	0.0157	0.0157	0.250	0.0125	pCi/g	12/01/20 15:11	12/16/20 18:21	1
Tracer										
Thorium-229										
89.5										
30 - 110										

Lab Sample ID: LCS 160-490633/2-A

Matrix: Solid

Analysis Batch: 492224

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 490633

Analyte	MB	MB	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	Limits
	Result	Qualifier									
Thorium-230	24.5		24.5	23.87		2.22	0.250	0.0678	pCi/g	97	81 - 118
Tracer											
Thorium-229											
90.6											
30 - 110											

Eurofins TestAmerica, St. Louis

QC Sample Results

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-40337-1 DU

Client Sample ID: HPPG-ESU-TU107A-B-001

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 492226

Prep Batch: 490633

Analyte	Sample	Sample	DU	DU	Total		RER	Limit		
	Result	Qual	Result	Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Thorium-228	0.373		0.4116		0.111	0.250	0.0327	pCi/g	0.18	1
Thorium-230	0.397		0.2667		0.102	0.250	0.0389	pCi/g	0.58	1
Thorium-232	0.344		0.3788		0.0971	0.250	0.0121	pCi/g	0.18	1
Tracer		DU DU		 		 		 		
<i>Thorium-229</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>							
	75.9		30 - 110							

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-489844/1-A

Client Sample ID: Method Blank

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 491443

Prep Batch: 489844

Analyte	MB	MB	Count	Total		Prepared	Analyzed	Dil Fac		
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit			
Actinium 228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Actinium-227	0.06310	U	0.159	0.159		0.330	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-212	0.0000	U	0.133	0.133		0.335	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-214	-0.008210	U	0.114	0.114		0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Cesium-137	0.007259	U	0.0689	0.0689	0.0700	0.0558	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-210	1.261		1.60	1.61		1.05	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-212	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-214	0.03327	U	0.0785	0.0786		0.0761	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Potassium-40	-0.5926	U	0.723	0.726		0.723	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-231	0.3075	U	0.995	0.995		0.778	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-234	0.03644	U	0.0817	0.0817		0.166	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-226	-0.008210	U	0.114	0.114	0.200	0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thallium-208	0.04141		0.0370	0.0373		0.0238	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium 228	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-232	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-234	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-235	-0.04770	U	0.334	0.334		0.304	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-238	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1

Lab Sample ID: LCS 160-489844/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 491441

Prep Batch: 489844

Analyte	Spike	LCS	LCS	Total		%Rec.	Limits		
	Added	Result	Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Americium-241	96.4	97.37		10.2		0.588	pCi/g	101	87 - 116
Cesium-137	26.7	26.30		2.84	0.0700	0.0907	pCi/g	98	87 - 120
Cobalt-60	9.47	9.183		0.997		0.0186	pCi/g	97	87 - 115

Eurofins TestAmerica, St. Louis

QC Association Summary

Page 142 of 143

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Rad

Leach Batch: 489020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40337-1	HPPG-ESU-TU107A-B-001	Total/NA	Solid	Dry and Grind	
160-40337-1 DU	HPPG-ESU-TU107A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 489844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40337-1	HPPG-ESU-TU107A-B-001	Total/NA	Solid	Fill_Geo-21	
MB 160-489844/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489844/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490603

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40337-1	HPPG-ESU-TU107A-B-001	Total/NA	Solid	DPS-7	
MB 160-490603/21-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490603/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Prep Batch: 490633

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40337-1	HPPG-ESU-TU107A-B-001	Total/NA	Solid	ExtChrom	
MB 160-490633/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-490633/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40337-1 DU	HPPG-ESU-TU107A-B-001	Total/NA	Solid	ExtChrom	

Eurofins TestAmerica, St. Louis

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40337-1
SDG: D1189461

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr (40-110)	Y (40-110)
160-40337-1	HPPG-ESU-TU107A-B-001	102	90.5
LCS 160-490603/1-A	Lab Control Sample	107	90.8
MB 160-490603/21-A	Method Blank	83.7	87.1

Tracer/Carrier Legend

Sr = Sr Carrier
Y = Y Carrier

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Th-229 (30-110)	
160-40337-1	HPPG-ESU-TU107A-B-001	77.4	
160-40337-1 DU	HPPG-ESU-TU107A-B-001	75.9	
LCS 160-490633/2-A	Lab Control Sample	90.6	
MB 160-490633/1-A	Method Blank	89.5	

Tracer/Carrier Legend

Th-229 = Thorium-229

Eurofins TestAmerica, St. Louis